Tribhuvan University

Institute of Engineering

Airport Engineering Course
[Basic Overview]

Er. Punya Raj Shakya

[M.Sc. in Eng., Ph.D]

Email: drprshakya@ntc.net.np

WELCOME
TO
Airport Engineering Course
[Basic Overview]

Objective

- Provide students general overview on Airport Engineering Course.

Outlines

- *ICAO History and Roles in Civil Aviation*
- **Scope and objective of Air Transportation**
- ***Airport Master Planning, Design, Construction and Operations***

ICAO History

Establishment of International Civil Aviation Organization

- Chicago, November, 1944
- Treaty: Convention on International Civil Aviation, 52 nations ,
- 96 articles
- After ratification by the legislature of 26 nations, the international civil aviation organization (ICAO) came into existence on April4, 1947.
- Specialized agency of the United Nations (in December 7, 1947)
- Currently 193 Member States
- No regulatory or enforcement power
- Relies on voluntary compliance
- Nepal gained the membership of ICAO in 1960.

ICAO

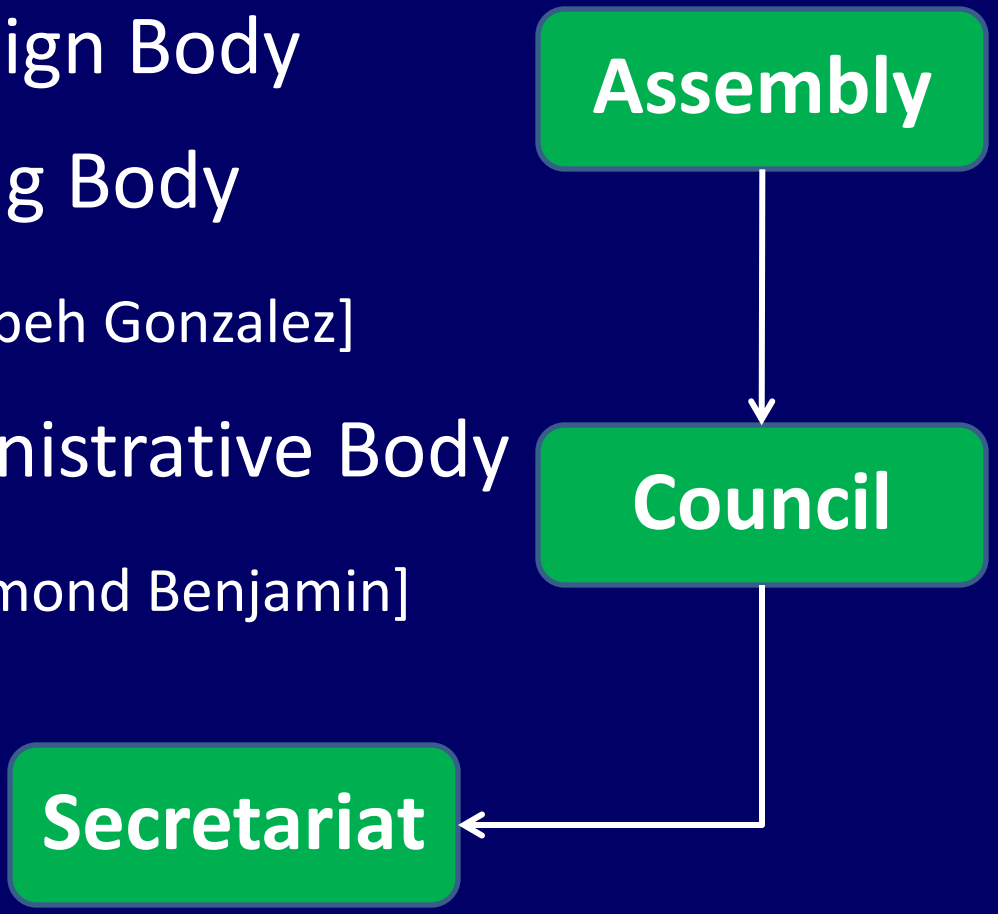
Three Organs:

1) **Assembly**: Sovereign Body
2) **Council**: Governing Body

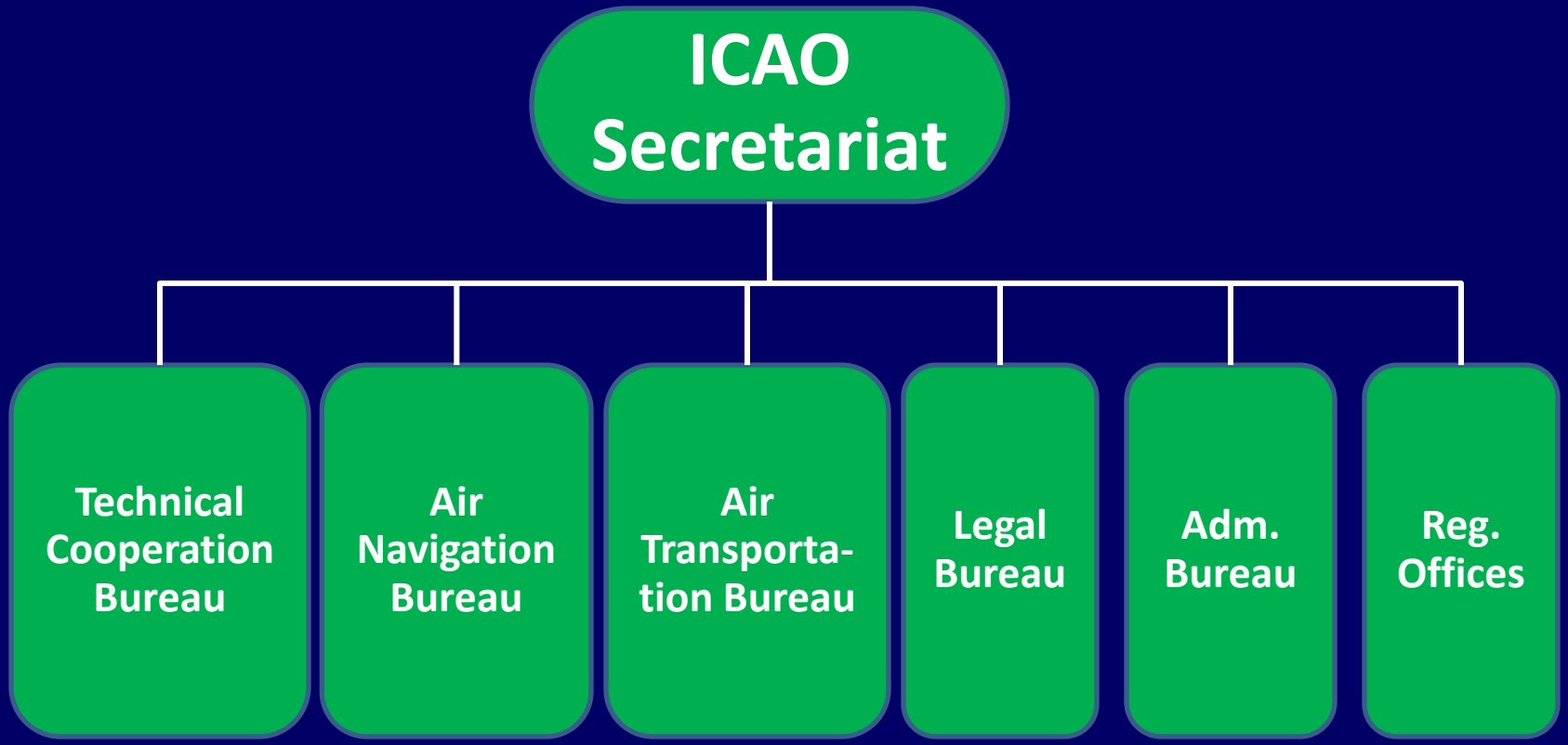
   [President – Roberto Kobeh Gonzalez]

3) **Secretariat**: Administrative Body

   [Secretary General: Raymond Benjamin]



ICAO Secretariat

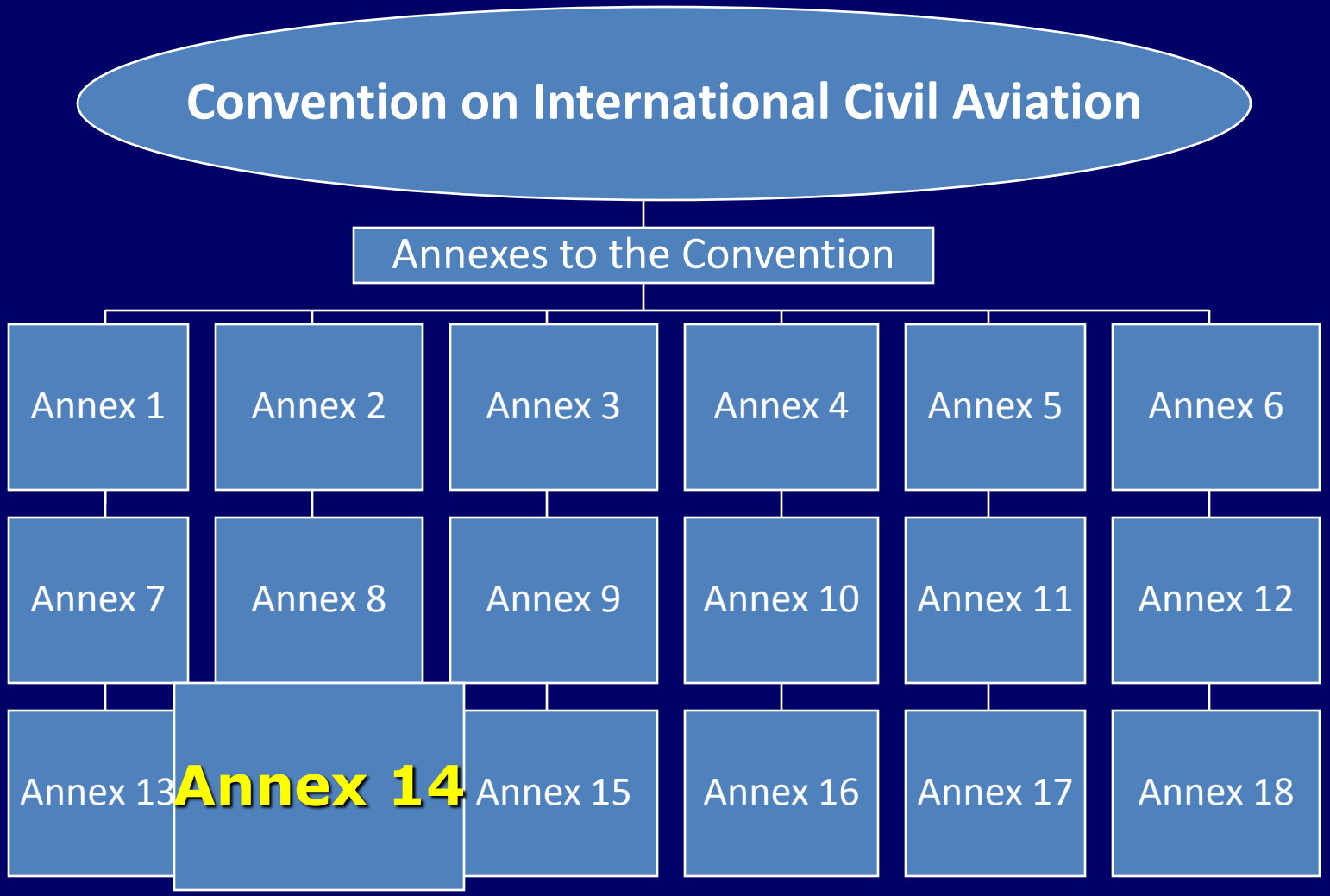


Convention on International Civil Aviation

Article 28 – States Obligations:
States undertake to provide airports in accordance with international specifications for global harmonization;

Article 37- States Obligations
States undertake to adopt international SARPs & procedures developed by ICAO to secure the highest practicable degree of uniformity in regulations, standards and Procedures.

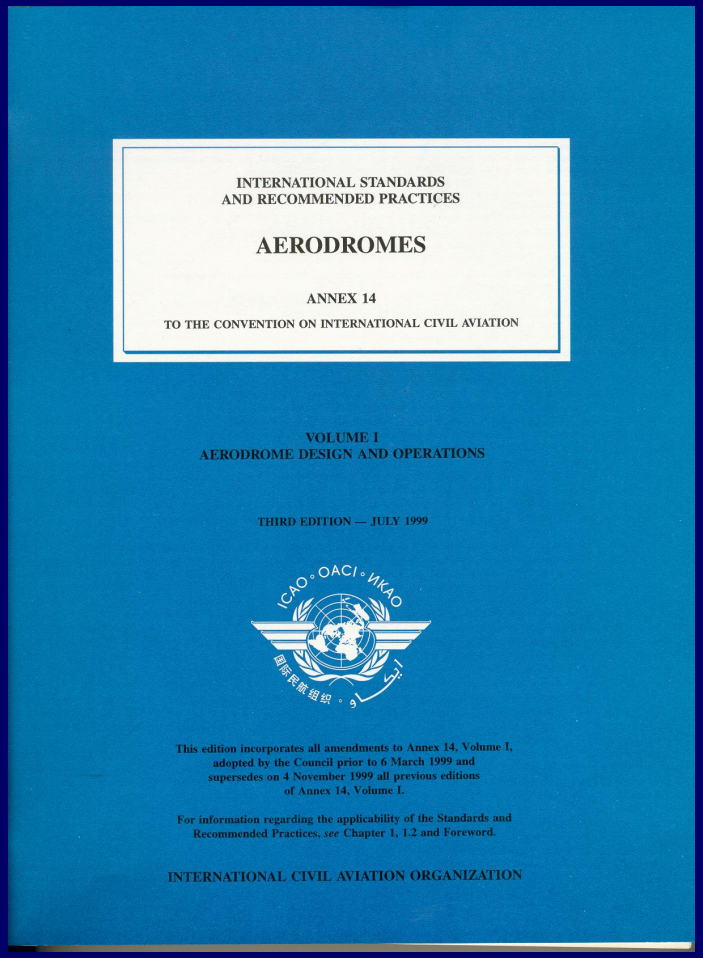
Article 44 – ICAO Mandate & Objectives
safe & orderly growth of international civil aviation;
Develop airways, Airports & air Navigation facilities;
Safe, efficient and Economical air Transport system


Convention on International Civil Aviation
Annexes to the Convention
Annex 1
Annex 2
Annex 3
Annex 4
Annex 5
Annex 6
Annex 7
Annex 8
Annex 9
Annex 10
Annex 11
Annex 12
Annex 13
Annex 14
Annex 15
Annex 16
Annex 17
Annex 18

ICAO Standards and Recommended Practices

- The ICAO Annex 14 provides international standards and recommended practices (SARPs) on aerodrome design and operations
- States are expected to adopt own regulations based on ICAO SARPs or may adapt the ICAO SARPs to suit local needs

ICAO Annex 14


INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERODROMES

ANNEX 14

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

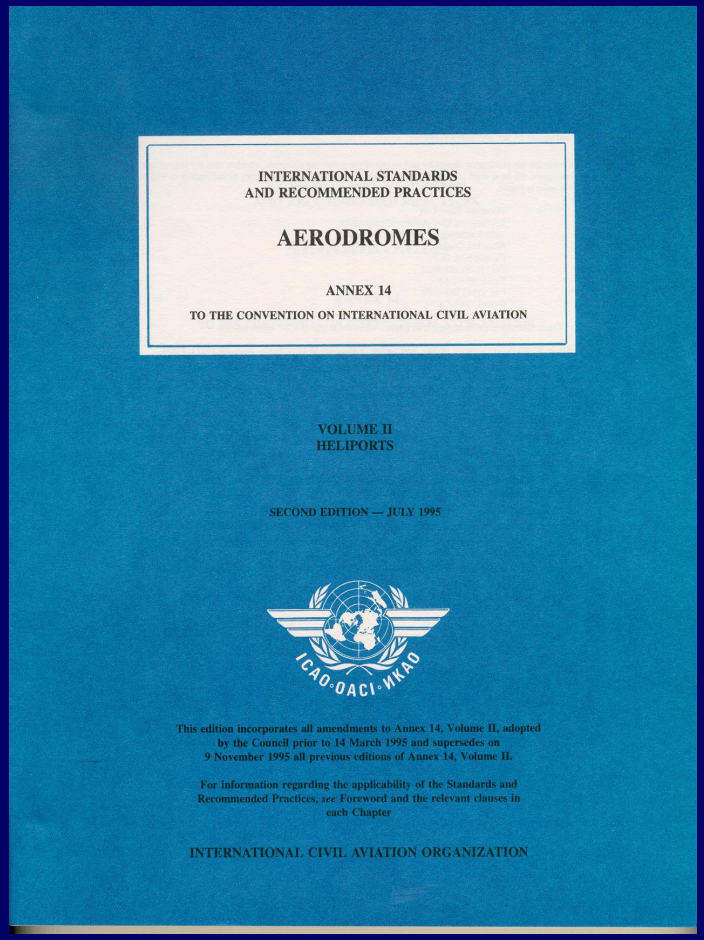
VOLUME I
AERODROME DESIGN AND OPERATIONS

THIRD EDITION — JULY 1999

This edition incorporates all amendments to Annex 14, Volume I, adopted by the Council prior to 6 March 1999 and supersedes on 4 November 1999 all previous editions of Annex 14, Volume I.

For information regarding the applicability of the Standards and Recommended Practices, *see* Chapter 1, 1.2 and Foreword.

INTERNATIONAL CIVIL AVIATION ORGANIZATION


INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERODROMES

ANNEX 14

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME II
HELIPORTS

SECOND EDITION — JULY 1995

This edition incorporates all amendments to Annex 14, Volume II, adopted by the Council prior to 14 March 1995 and supersedes on 9 November 1995 all previous editions of Annex 14, Volume II.

For information regarding the applicability of the Standards and Recommended Practices, *see* Foreword and the relevant clauses in each Chapter

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Contents of Annex 14, Volume I – Aerodrome Design and Operations

Chapter 1 – General (Definitions,.....Aerodrome Reference codes etc.)
Chapter 2 – Aerodrome data
Chapter 3 – Physical characteristics
Chapter 4 – Obstacle restriction and removal
Chapter 5 – Visual Aids for navigation
Chapter 6 – Visual Aids for denoting obstacles
Chapter 7 – Visual Aids for denoting restricted use areas
Chapter 8 – Electrical Systems
Chapter 9 – Aerodrome operational services, equipment and installations
Chapter 10 – Aerodrome maintenance

PUBLICATIONS
(related to the specifications of this Annex)

***Aerodrome Design Manual* (Doc 9157)**

Part I - Runways

Part 2 - Taxiways, Aprons and Holding Bays

Part 3 - Pavements

Part 4 - Visual Aids

Part 5 - Electrical Systems

Part 6 - Frangibility

PUBLICATIONS
(related to the specifications of this Annex)

Airport Services Manual (Doc 9137)

Part 1 - Rescue and Fire Fighting
Part 2 - Pavement Surface Conditions
Part 3 - Bird Control and Reduction
Part 5 - Removal of Disabled Aircraft
Part 6 - Control of Obstacles
Part 7 - Airport Emergency Planning
Part 8 - Airport Operational Services
Part 9 - Airport Maintenance Practices

PUBLICATIONS
(related to the specifications of this Annex)

Airport Planning Manual (Doc 9184)

Part I - Master Planning

Part 2 - Land Use and Environmental Control

Part 3 - Guidelines for Consultant/Construction Services

- ***Heliport Manual (Doc 9261)***
- ***Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476)***
- ***Manual on Certification of Aerodromes (Doc 9774) Manual on Laser Emitters and Flight Safety (Doc 9815)***
- ***Manual on the ICAO Bird Strike Information System (IBIS) (Doc 9332)***
- ***Safety Management Manual (SMM) (Doc 9859)***
- ***Stolport Manual (Doc 9150)***
- ***World Geodetic System - 1984 (WGS-84) Manual (Doc 9674)***

Standards and Recommended Practices (SARPs)

Standard

"Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognised as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention".

[*Standards* have been printed in light face roman and the operative verb "shall" is used.

Example: 5.3.5.10 The systems shall be suitable for both day and night operations.]

Standards and Recommended Practices (SARPs)

Recommended Practice

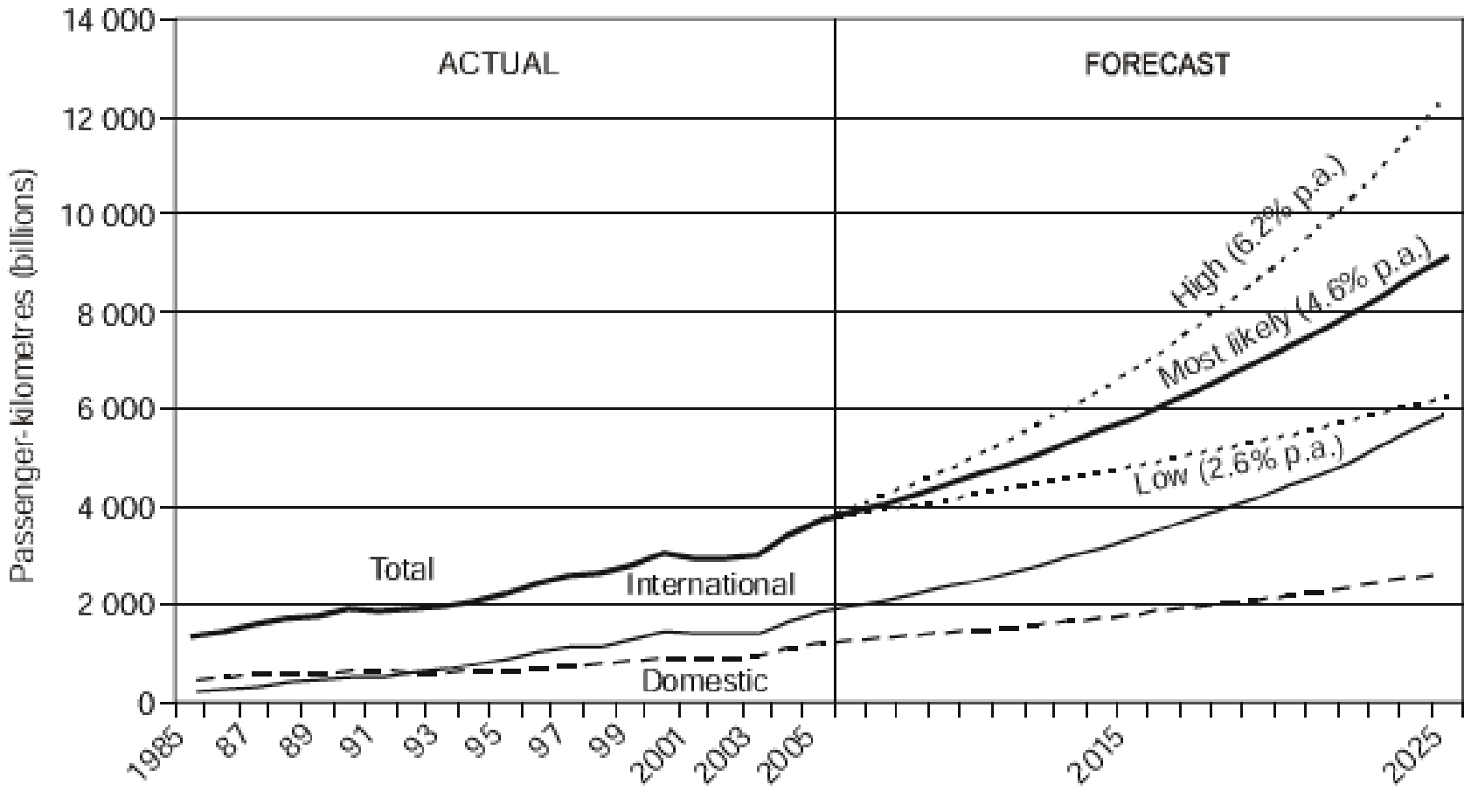
"Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognised as desirable in the interest of safety , regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention".

Recommended Practices have been printed in light face italics and the operative verb "**should**" is used.

Example: 6.3.21 **Recommendation.—** *The installation setting angles for high-intensity obstacle lights, Types A and B, should be in accordance with Table 6-2.*

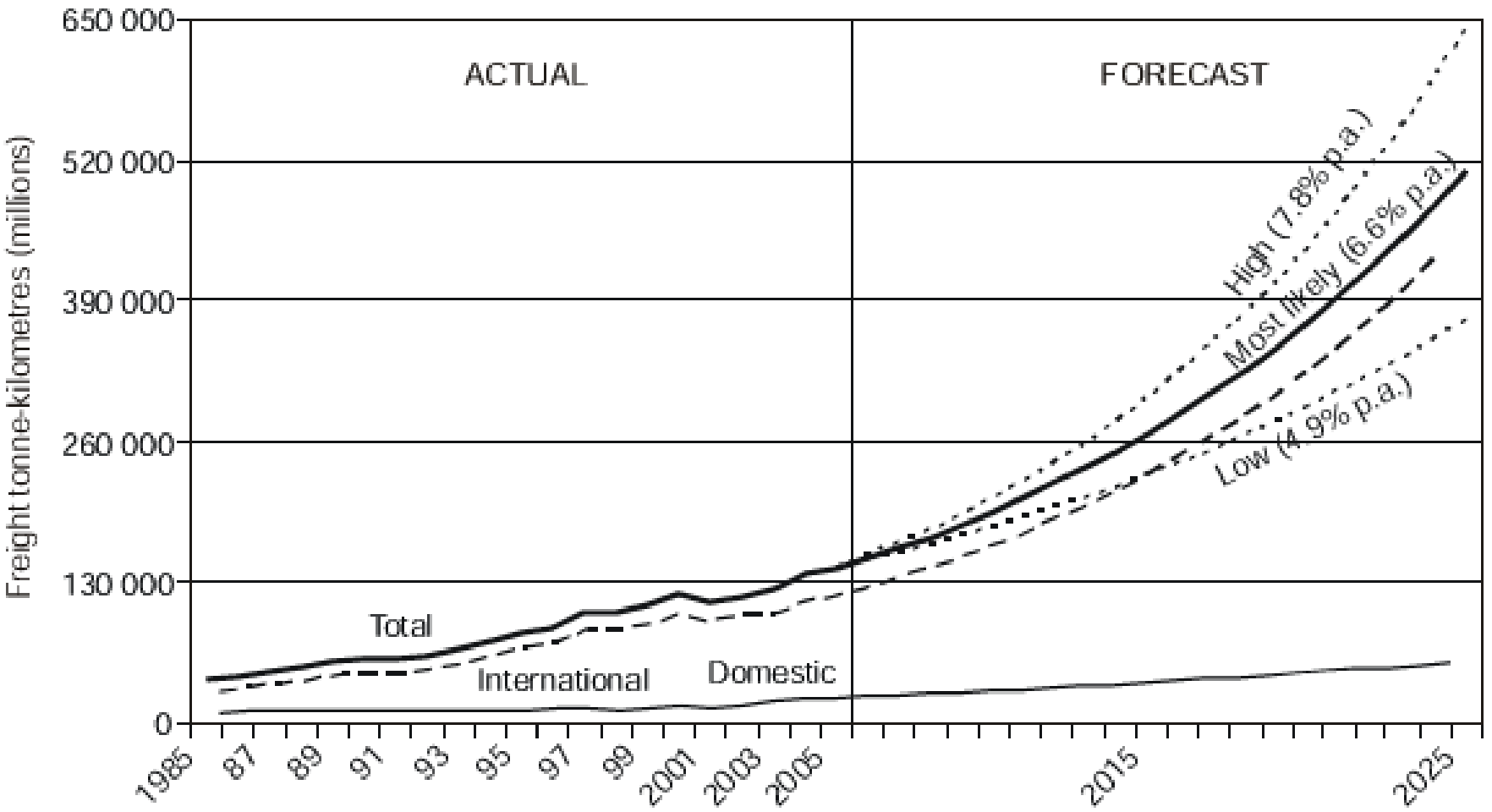
Scope and objective of Air Transportation

Global Passenger Forecasts



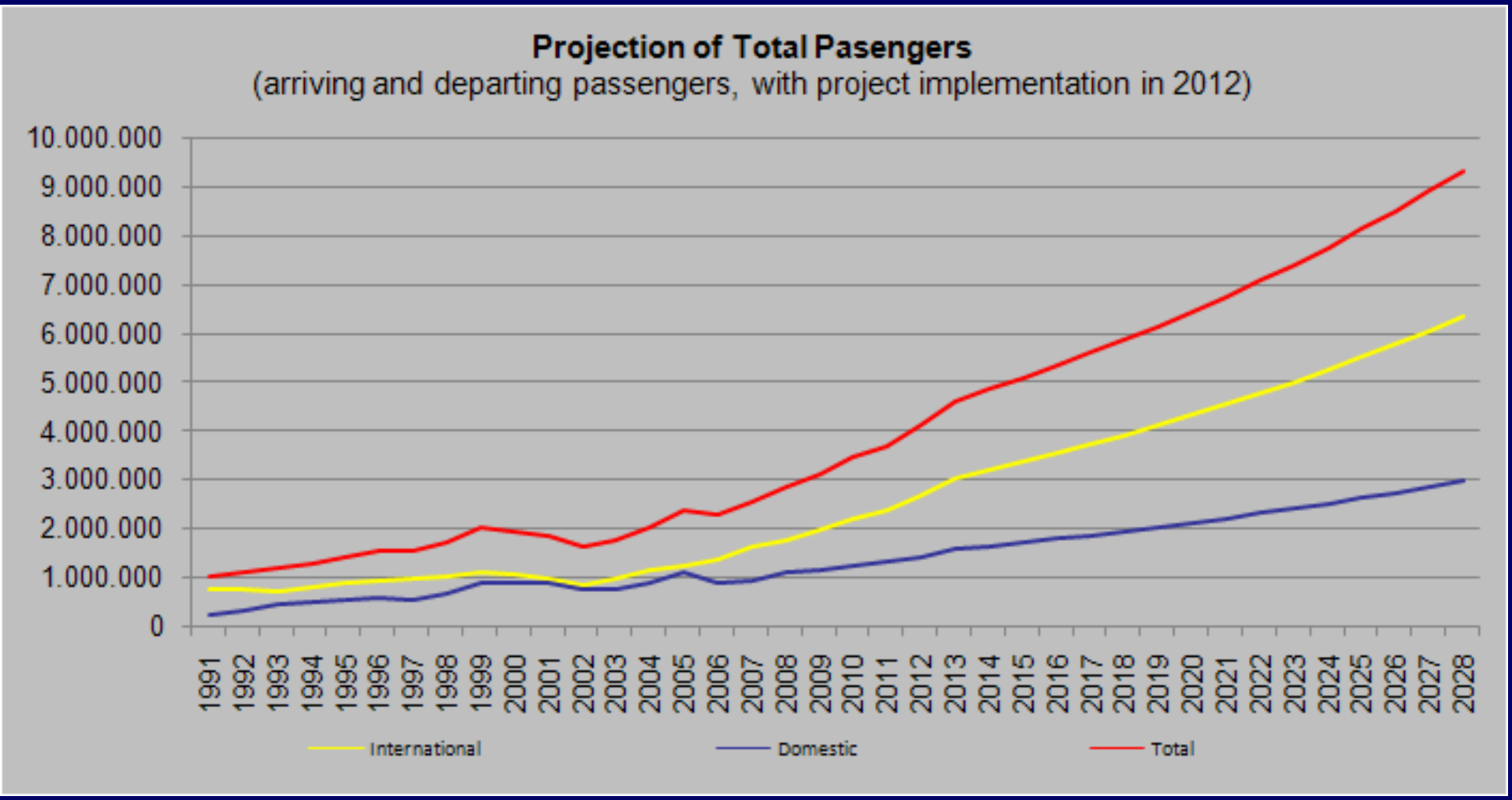
Source: ICAO

Global Freight Forecasts



Source: ICAO

Traffic Forecast – Tribhuvan International Airport



Source: CAAN

Passenger Traffic Forecast – Comparison [Passenger-Kilometers (Billions)]

	2005	2025	Av. Annual Growth Rate, Percent
World	3720	9180	4.6
Asia-Pacific Region	967.4	2980	5.8
Regional Share of the World	26	32.5	

Source: ICAO

Passenger Traffic Forecast – Comparison: In Millions

	2005	2025	Av. Annual Growth Rate, Percent
World	2022	4500	4.1
Asia-Pacific Region	-	-	-
Nepal	1.17	1.69	1.24 to 2.31

Source: ICAO & CAAN

Scope and objective of Air Transportation

Safety

- Air transport has a strong tradition of giving top priority to safety.

Year	Number of passenger fatalities per 100 million passenger-kilometres flown
1960	0.8
1980	0.08
1990	0.03
2005	0.02

Quality Of Service

Significant enhancements in the quality of service provided to :

- airline customers;
- journey time;
- convenience and reliability of service;
- comfort in the aircraft cabin and the range of on-board facilities

Aircraft departures have increased by around 270 per cent between 1960 and 2005 is evidence of improvement in service frequency and convenience

Airport Master Planning, Design, Construction and Operations

Airport Master Planning, Design, Construction and Operations

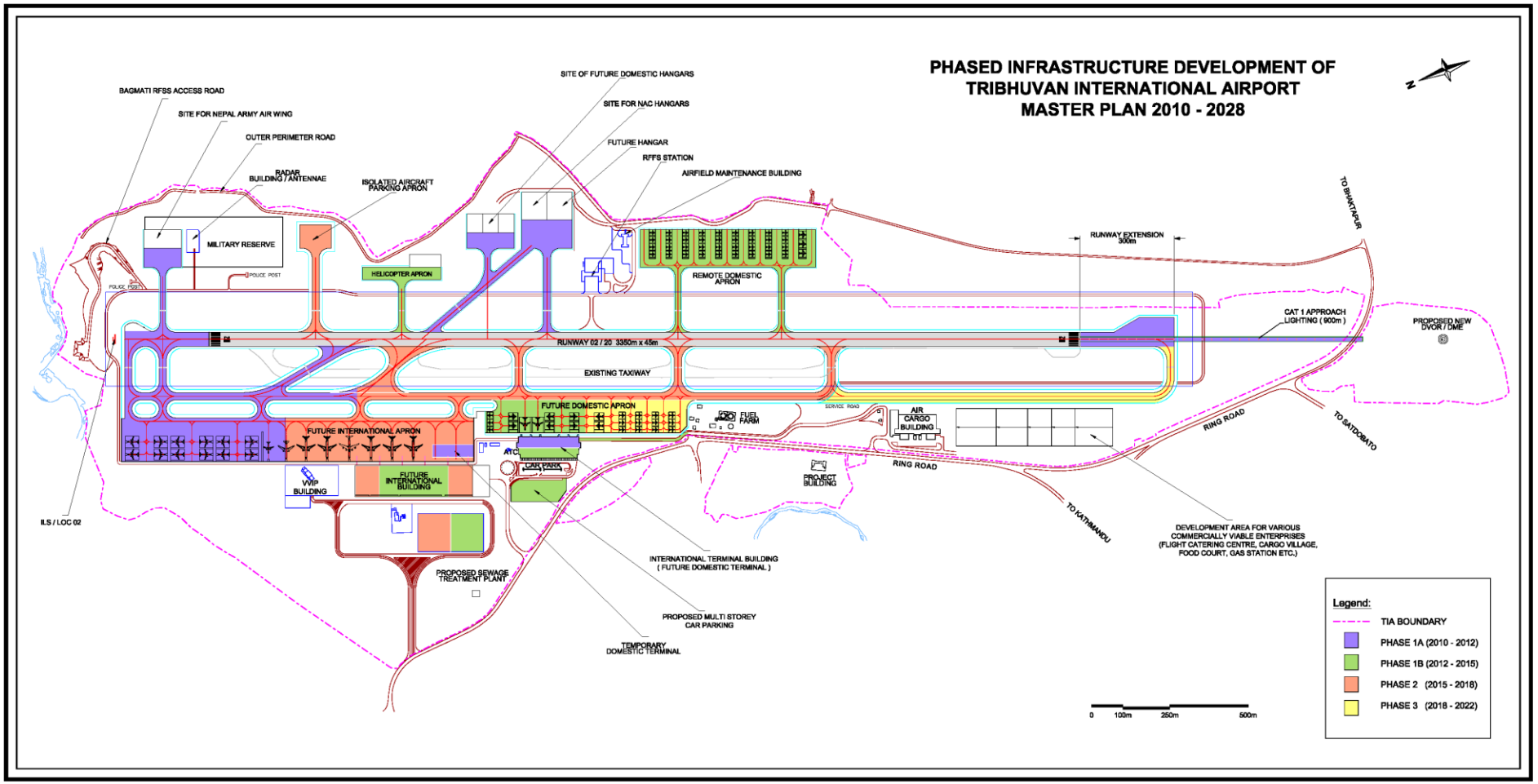
→ *Part I – Airport Master Plan.*

→ *Part II - Aerodrome Design.*

→ *Part III - Aerodrome Construction.*

→ *Part IV - Aerodrome Operations.*

Part I – Airport Master Plan



Airport Master Plan

Airport master plan is a guide for:

→ *Development of physical facilities on the airport.*

→ *Development of land uses for areas surrounding the airport.*

→ *Determination of environmental effects of aerodrome construction and operation.*

→ *Establishment of airport access requirements.*

Airport Master Plan

Air Traffic Forecast:

→ In terms of passengers, cargo and mails.

→ In terms of Aircraft movements.

Note: Air traffic forecasts are generally produced on an annual basis.

Conversion of Annual Traffic Forecasts into Planning Criteria:

→ Typical peak hour throughput of passengers, cargo and mails.

→ Typical peak hour aircraft movements.

Note: Categorized by arrivals and departure as well as combined.

Airport Master Plan

Two components of airport:

→ Airside

→ Landside

Airside View of Airport

Airside View of Airport

Airside View of Airport

Airside Elements

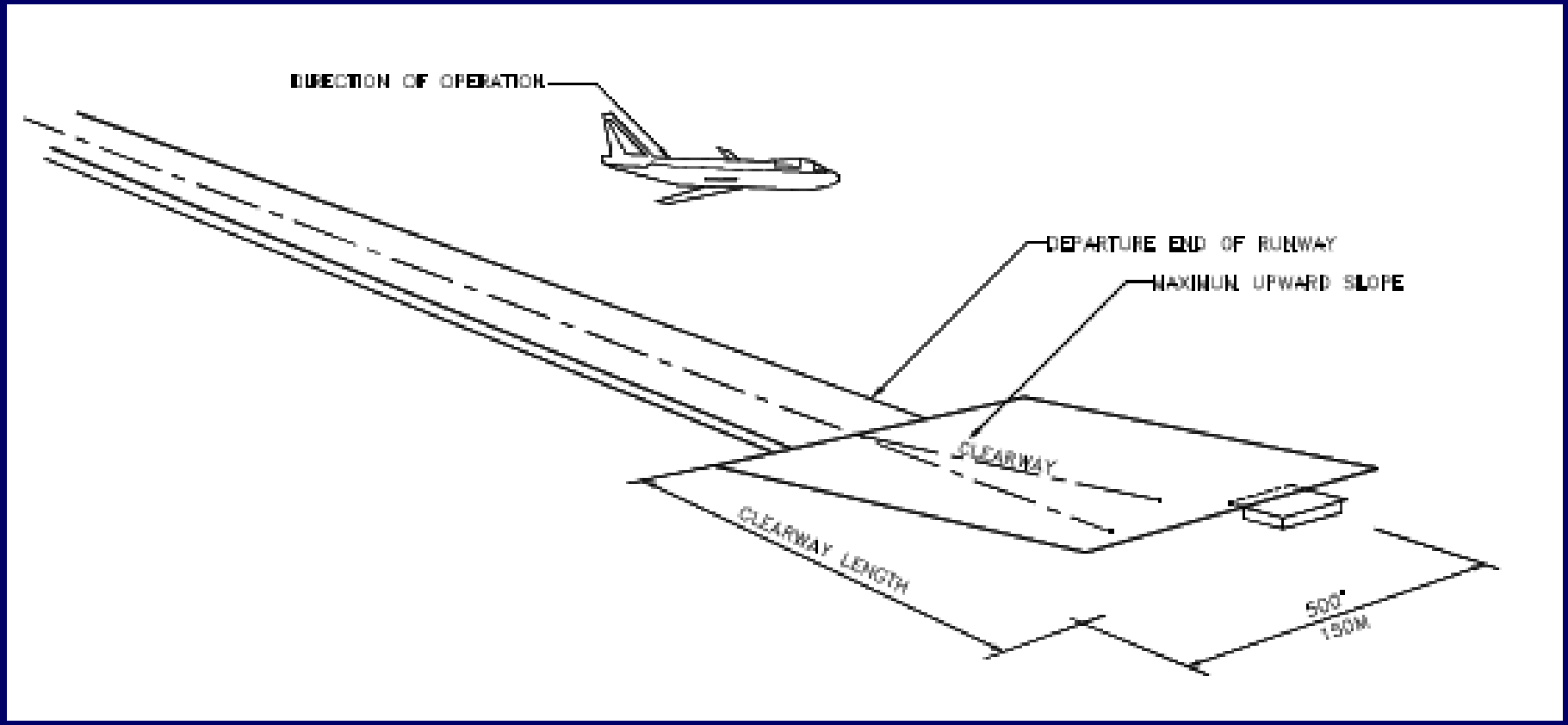
- Runway(s) [and Stopway(s)]
  - Runway shoulders
  - Runway strips
  - Runway end safety area
  - Clearways
- Taxiway(s)
  - Taxiway shoulders
  - Taxiway strips
- Apron(s)
  - Aircraft Parking Apron
  - Cargo Apron
  - General Aviation Apron
  - Helicopter Apron

Airside Elements

- Holding bay(s)
- Isolated Aircraft Parking Area
- Airfield Drainage
- Airport Periphery Road
- Aerodrome Control Tower
- Buildings for Radio Navigation Aids
- Electrical Sub-stations
- Rescue and Fire Fighting Complexes
- Aircraft Maintenance Hangars

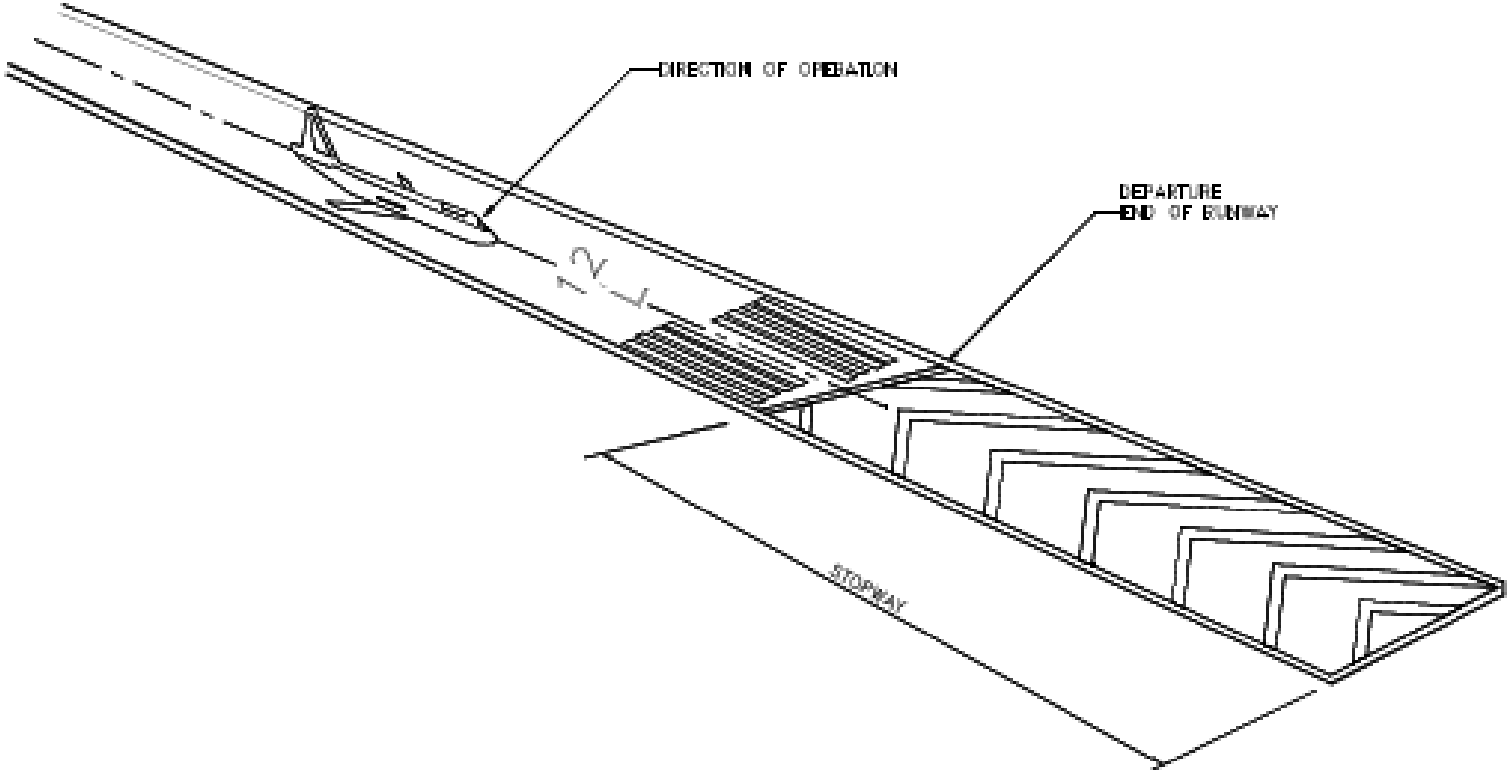
Airside Elements

Airside Elements



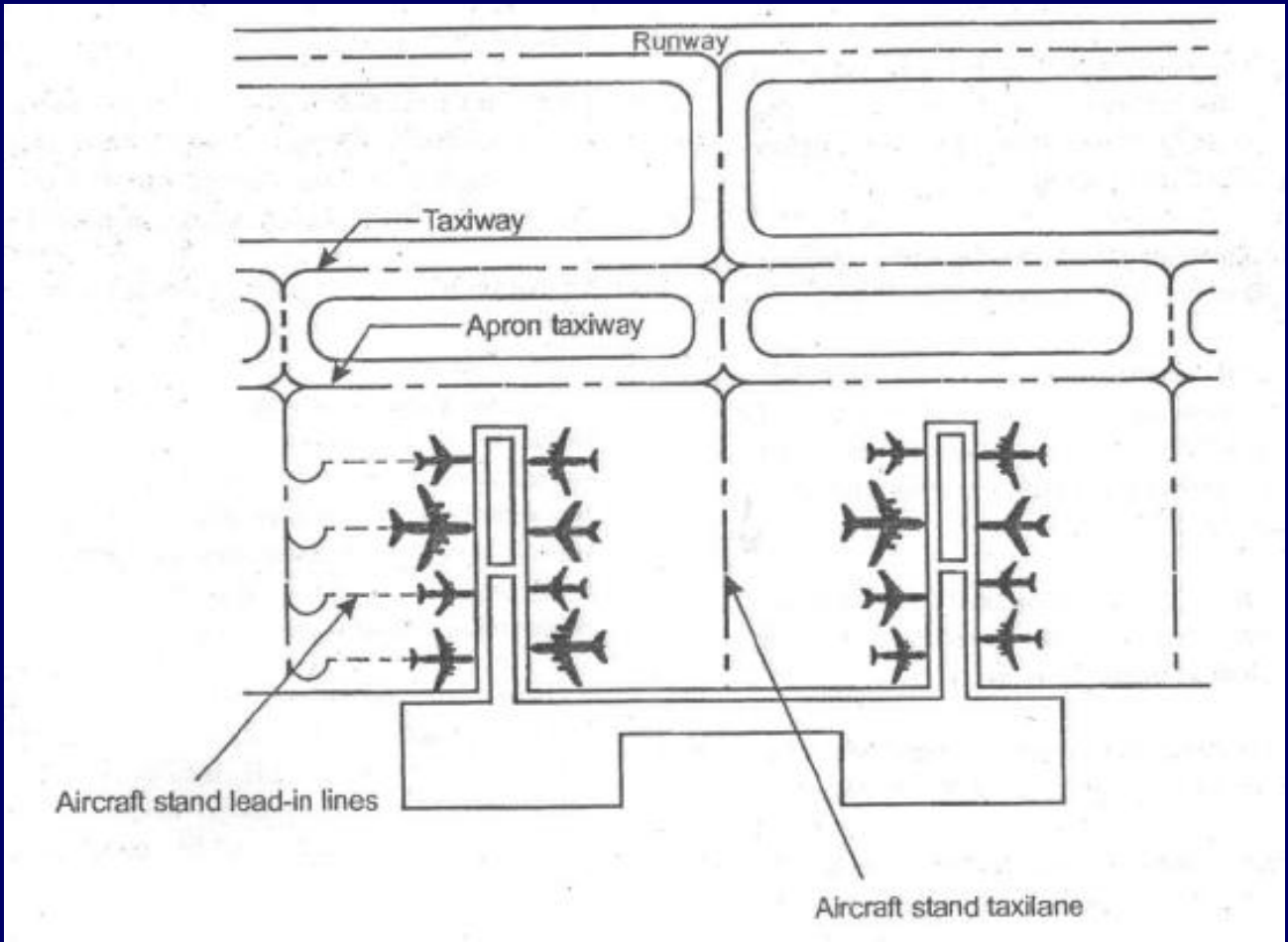
Clearway

Airside Elements



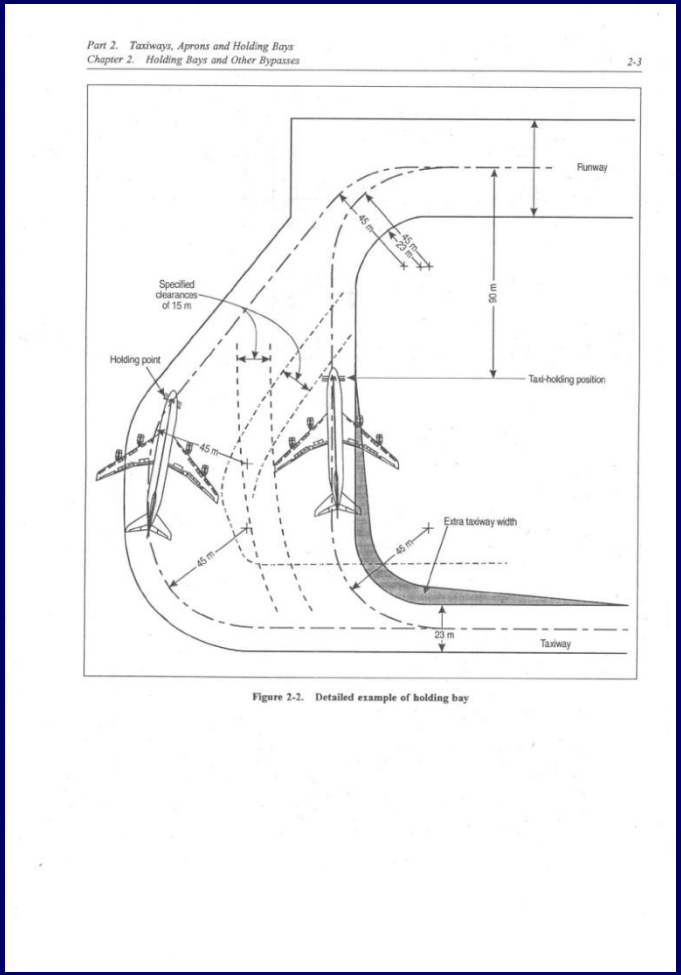
Stopway

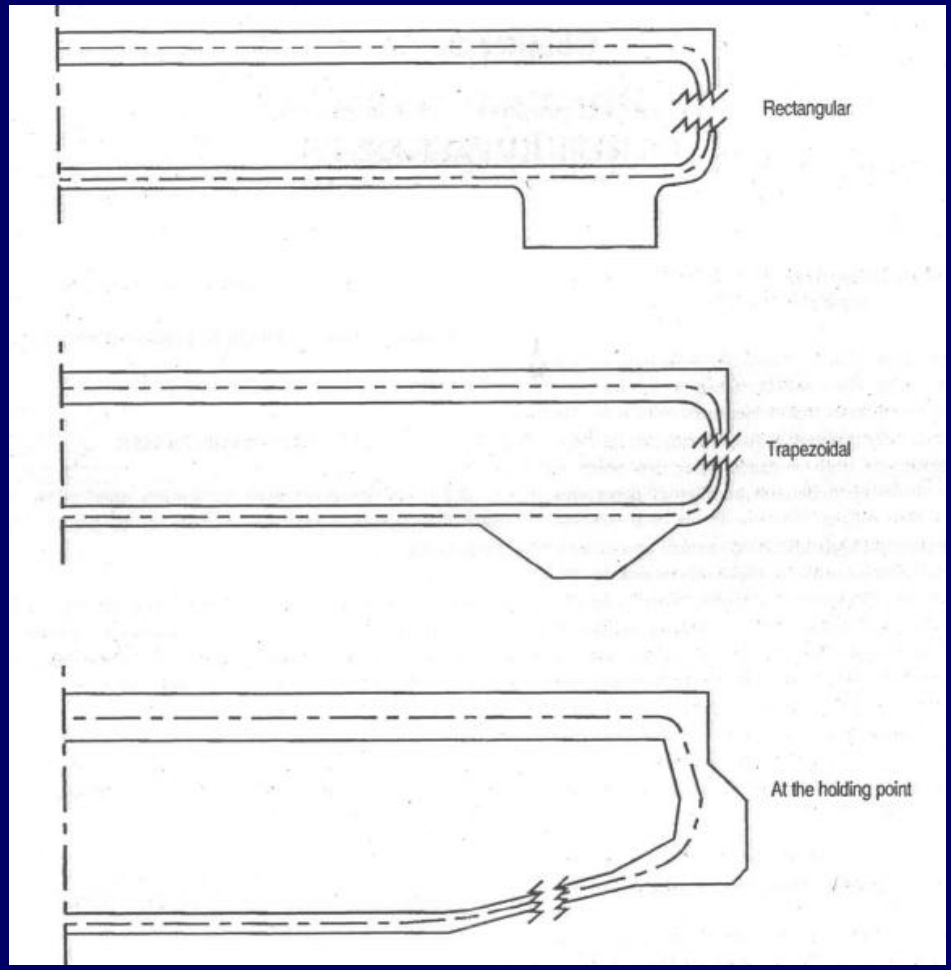
Airside Elements



Runway, taxiways and apron

Airside Elements





Typical holding bay

Holding bays at different locations

Landside Elements

- Terminals
  - Passenger Terminals
  - Cargo Terminals
  - General Aviation Terminal
- Administration and Maintenance Buildings
- Meteorological Services Building
- Flight Catering Building
- Fuel Farm
- Airport Hotels

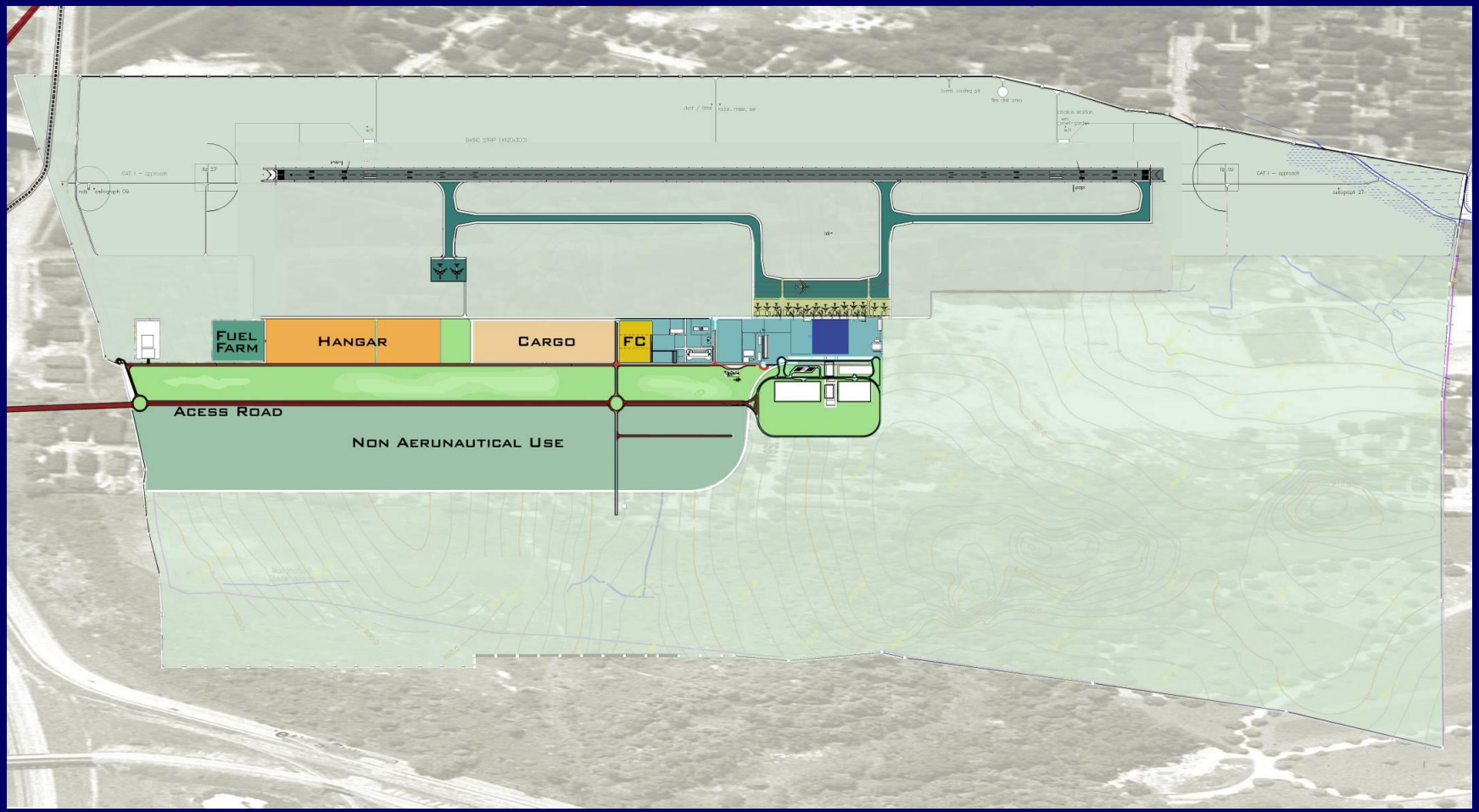
Landside Elements

- Power/Generator Houses
- Sewerage Treatment and Pump Stations
- Security Fences and Control Gates
- Car Parks
- Access Roads

Landside Elements

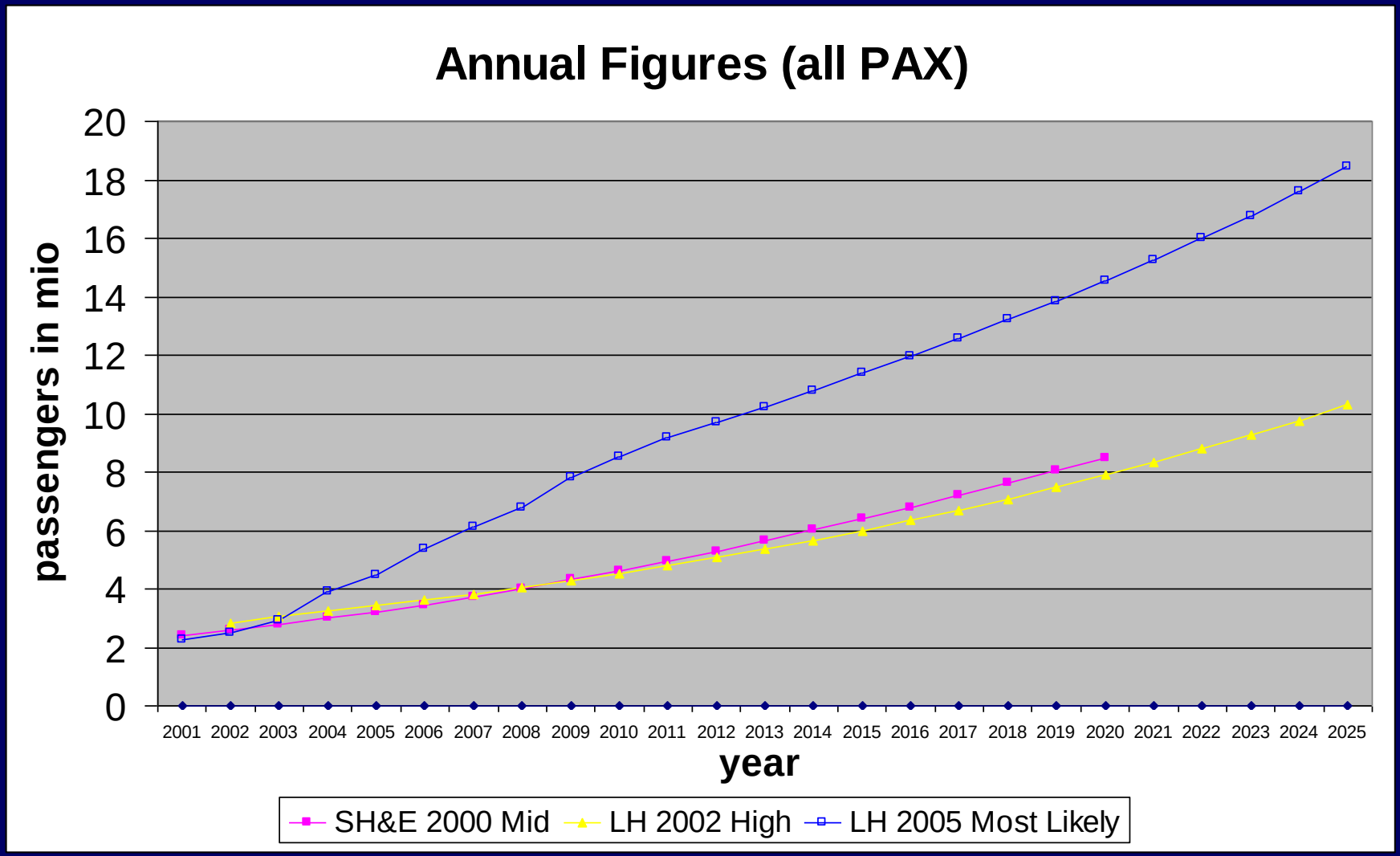
Landside Elements

Airport Master Plan



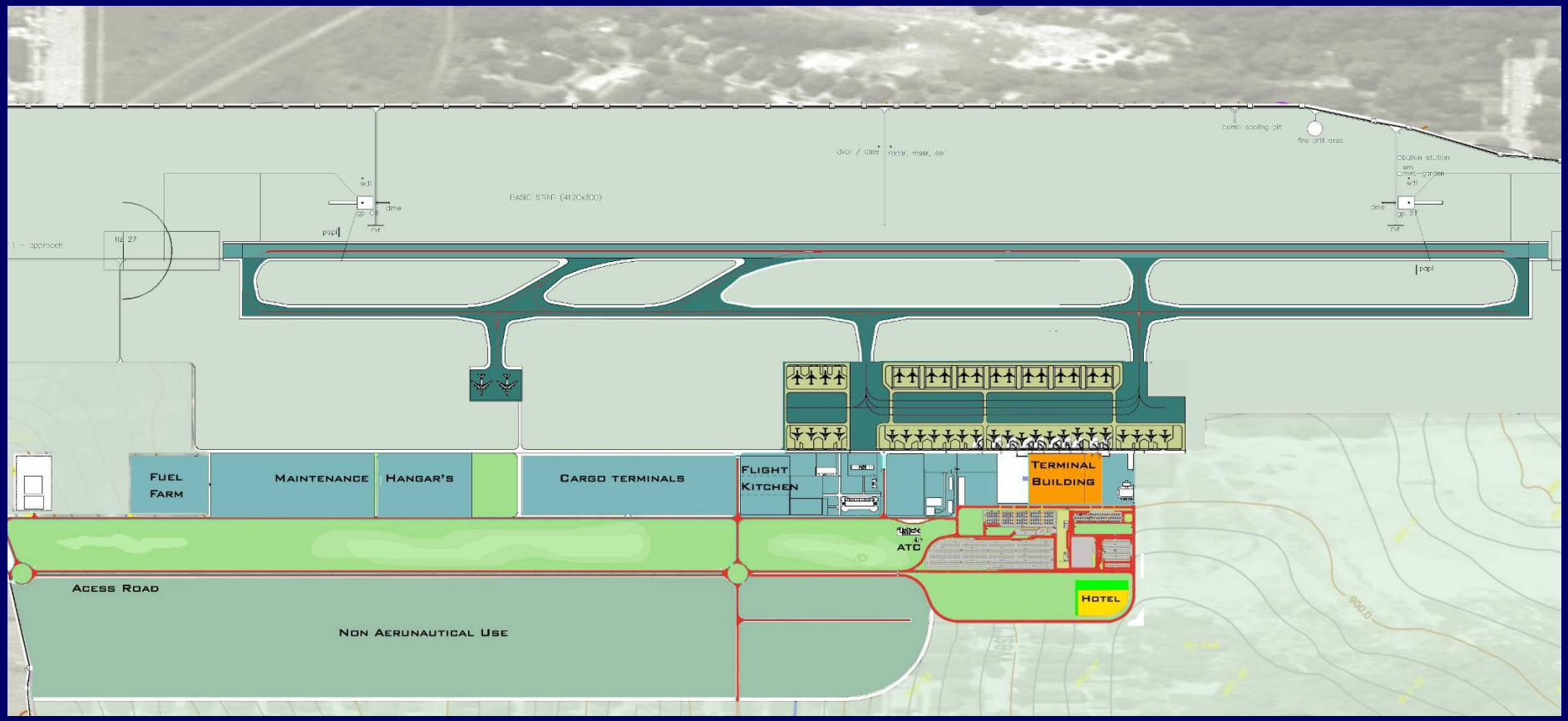
Airport Layout Plan – Initial 2003

Airport Master Plan



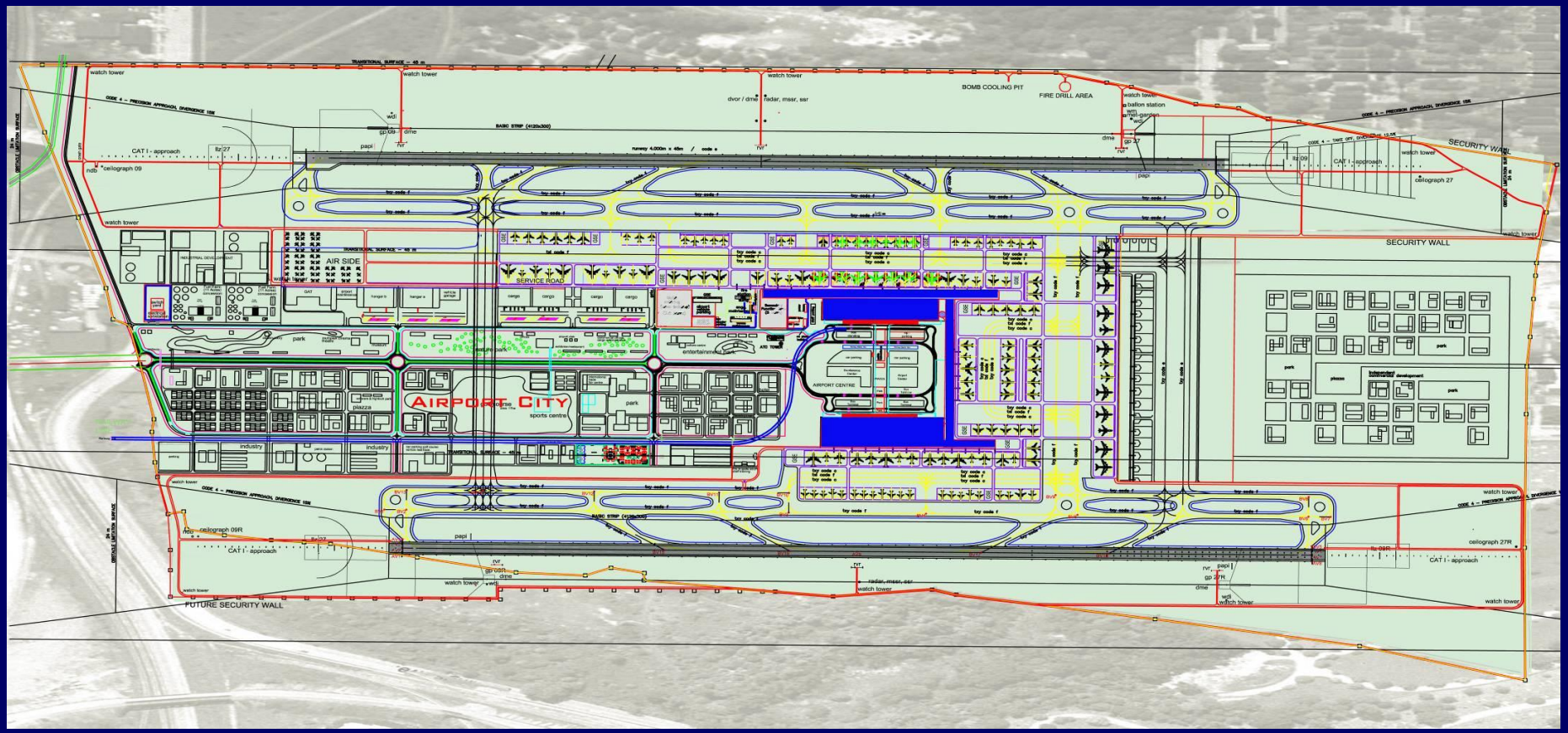
Air traffic Forecast

Airport Master Plan



Airport Layout Plan - 2008

Airport Master Plan



Ultimate Airport Development Plan - 2040

ท่าอากาศยานสุวรรณภูมิ
SUVARNABHUMI AIRPORT
คลองบางน้ำจืด
KHLONG BANG NAM CHUAT
คลองบางพลีใหญ่
KHLONG BANG PHLI YAI
อ. บางพลี
A. BANG PHLI
คลองสำโรง
KHLONG SAMRONG
คลองสลุด
KHLONG SALUT
คลองบัวเกราะ
KHLONG BUA KRO
คลองตาพุก
KHLONG TA PHUK
คลองด่อน
KHLONG DON
คลองปากน้ำ
KHLONG PAK NAM
คลองหัวตะเข้
KHLONG HUA TAKHE

Part II - Aerodrome Design

Aerodrome Design

Design/Critical Aircraft:

- For determination of aerodrome reference code:
  - Aeroplane reference field length;
  - Wing span and outer main gear wheel span.
- For aerodrome pavement design:
  - Maximum all up mass/take-off mass;
  - Configuration of landing gears and characteristics of wheels.
- For determination of aerodrome category for Rescue and Fire Fighting Services (RFFS):
  - Aeroplane Overall length;
  - Maximum fuselage width.

Aerodrome Design

Geometric Design of the Aerodrome:

→ Aerodrome reference code of design aircraft

- ↗ Aeroplane reference field length;
- ↗ Wing span and outer main gear wheel span.

Note: These parameters are generally available in aeroplane manufacturers document entitled Aeroplane Characteristics for Airport Planning – NAS 3601 (aircraft operation manual).

Aerodrome Design

Geometric Design of the Aerodrome

Aerodrome Reference Code

Code element 1		Code element 2		
Code Number (1)	Aeroplane reference field length (2)	Code letter (3)	Wing span (4)	Outer main gear wheel span (5)
1	Less than 800 m	A	Up to but not including 15 m	Up to but not including 4.5 m
2	800 m up to but not including 1200 m	B	15 m up to but not including 24 m	4.5 m up to but not including 6 m
3	1200 m up to but not including 1800 m	C	24 m up to but not including 36 m	6 m up to but not including 9 m
4	1800 m and over	D	36 m up to but not including 52 m	9 m up to but not including 14 m
		E	52 m up to but not including 65 m	9 m up to but not including 14 m
		F	65 m up to but not including 80 m	14 m up to but not including 16 m

Aerodrome Design

Geometric Design of the Aerodrome

Factors affecting the length of runway:

- → Performance characteristics and *operating masses* of the aeroplane;
- → Weather, particularly *surface wind* and *temperature*;
- → Runway characteristics such as *slope* and *surface conditions*; and
- → Aerodrome location factors, for example, *aerodrome elevation* which affects the barometric pressure and topographical constraints.

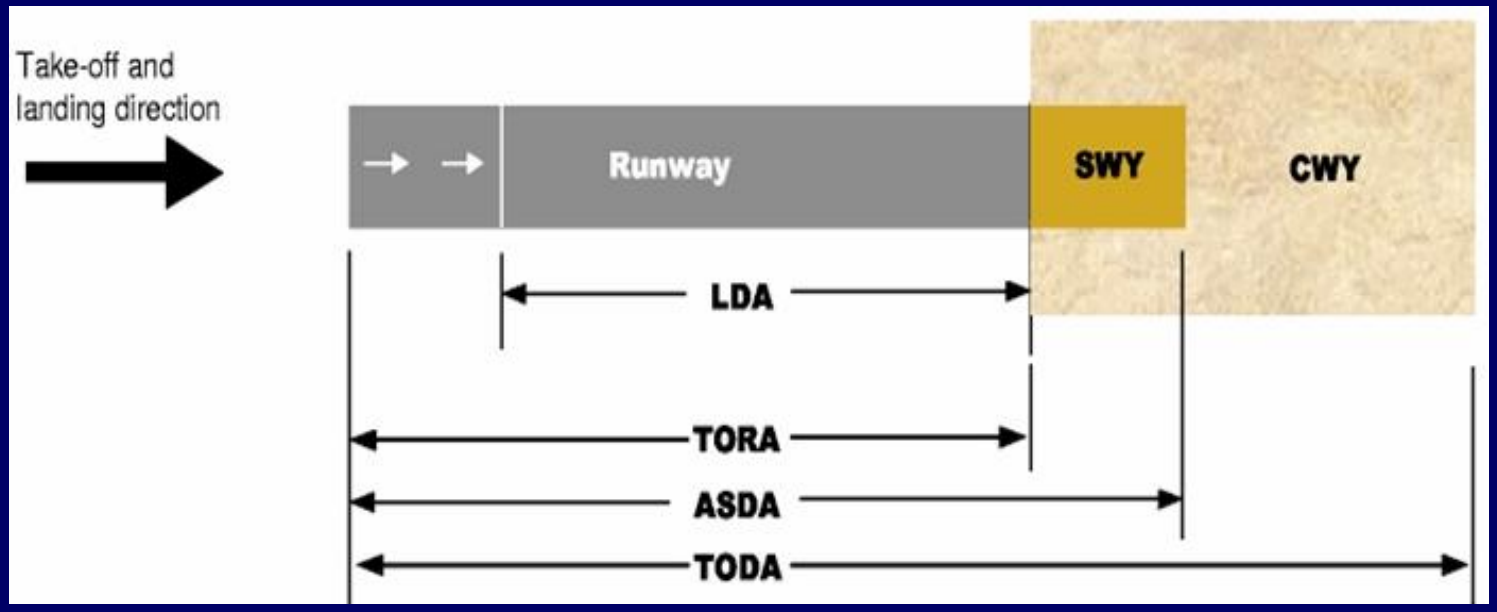
Aerodrome Design

Geometric Design of the Aerodrome

Calculation of declared distances. The declared distances must be calculated in accordance with the following:

(i) Take-off run available (TORA) is defined as the length of runway available for the ground run of an aeroplane taking off. This is normally the full length of the runway; neither the SWY nor CWY are involved.

TORA = Length of RWY



Aerodrome Design

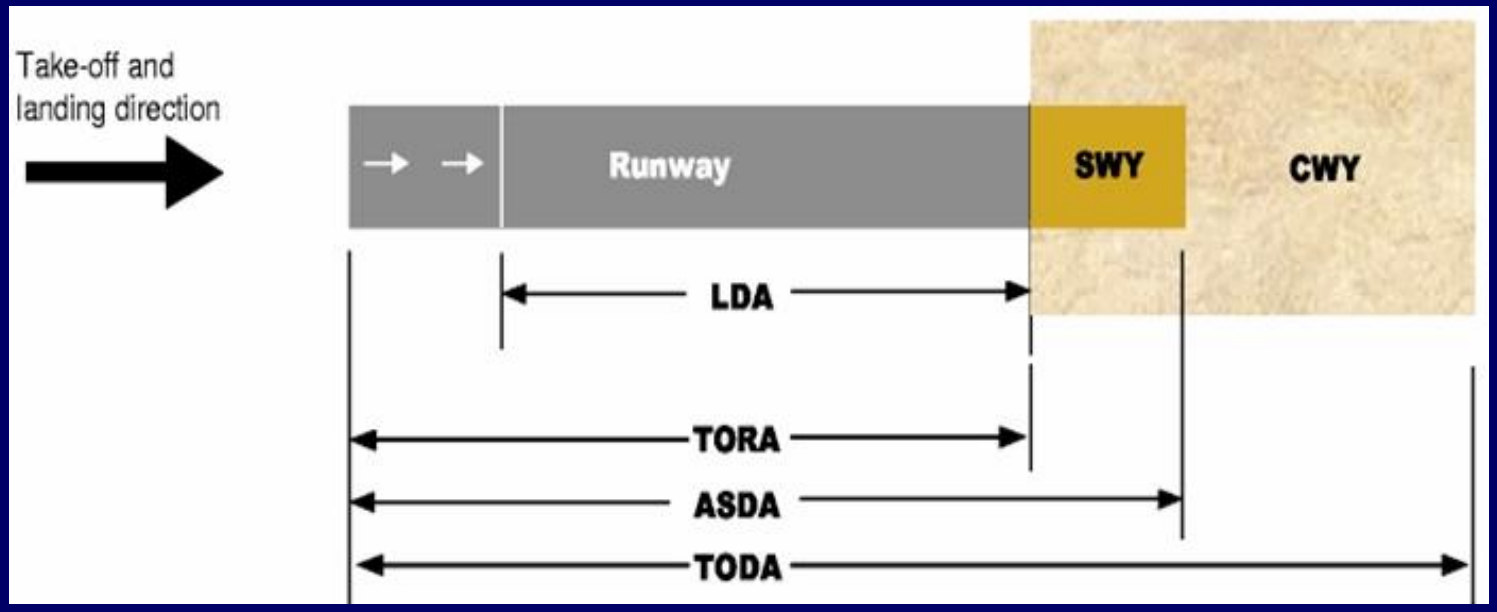
Geometric Design of the Aerodrome

Calculation of declared distances.

(ii) Take-off distance available (TODA) is defined as the distance available to an aeroplane for completion of its ground run, lift-off and initial climb to 35 ft.

- ✓ This will normally be the full length of the runway plus the length of any CWY.

TODA =TORA + CWY



Aerodrome Design

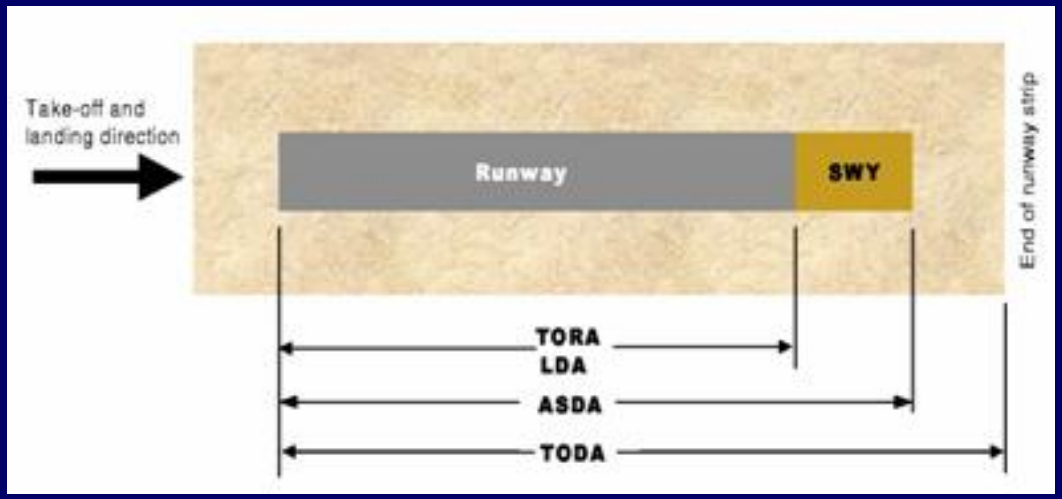
Geometric Design of the Aerodrome

Calculation of declared distances.

(ii) Take-off distance available (TODA)

- ✓ Where there is no designated CWY, the part of the runway strip between the end of the runway and the runway strip end is included as part of the TODA.

TODA =TORA + RWY Strip length



- ✓ Each TODA must be accompanied by an obstacle clear take-off gradient expressed as a percentage.

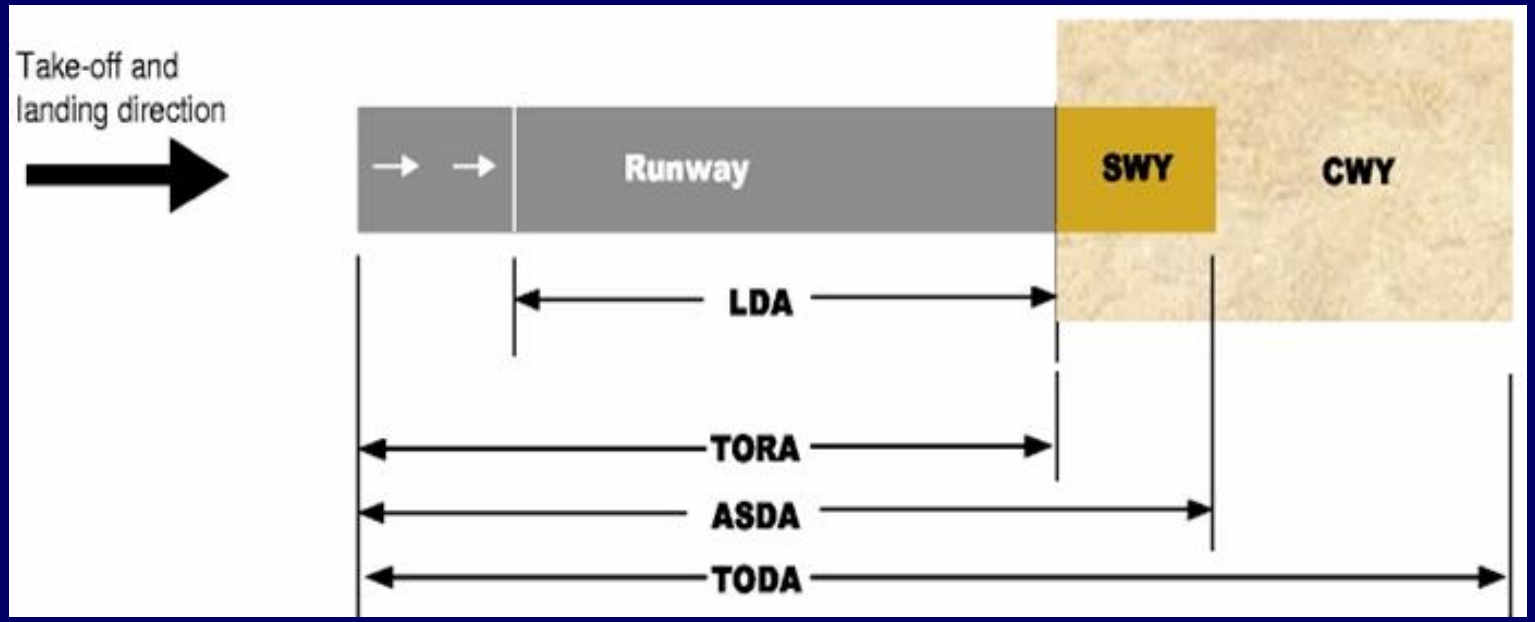
Aerodrome Design

Geometric Design of the Aerodrome

Calculation of declared distances (continued)

(iii) Accelerate-stop distance available (ASDA) is defined as the length of the take-off run available plus the length of any SWY. Any CWY is not involved.

ASDA = TORA + SWY



Aerodrome Design

Geometric Design of the Aerodrome

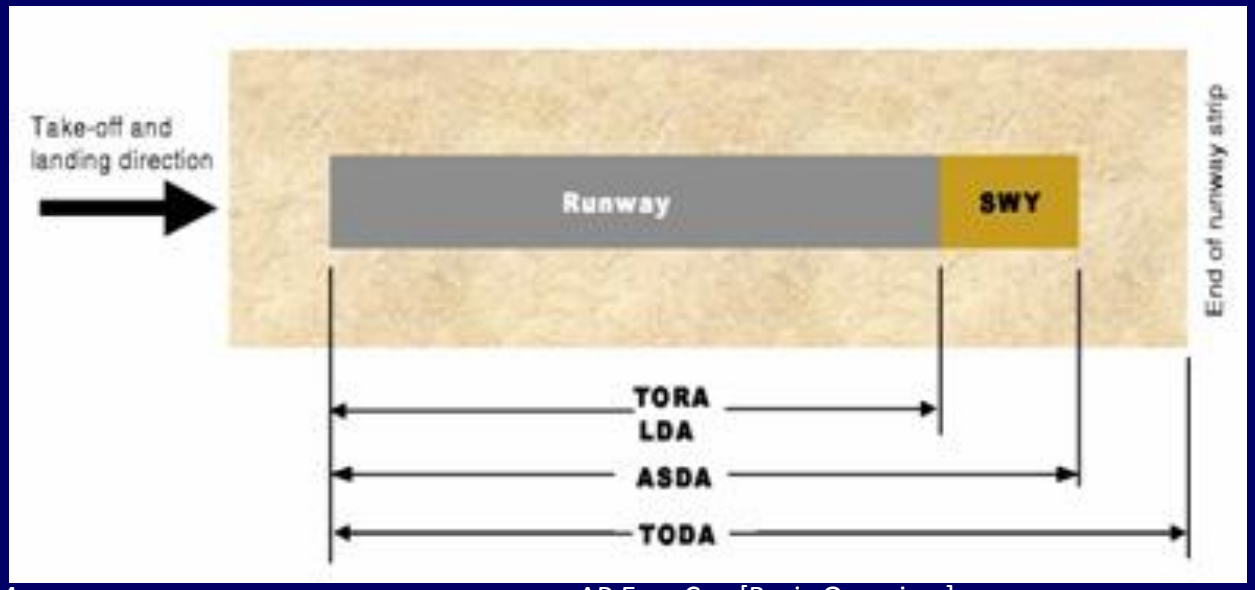
Calculation of declared distances (continued)

(iv) Landing distance available (LDA) is defined as the length of runway available for the ground run of a landing aeroplane.

The LDA commences at the runway threshold.

Neither SWY nor CWY are involved.

LDA = Length of RW (if threshold is not displaced.)

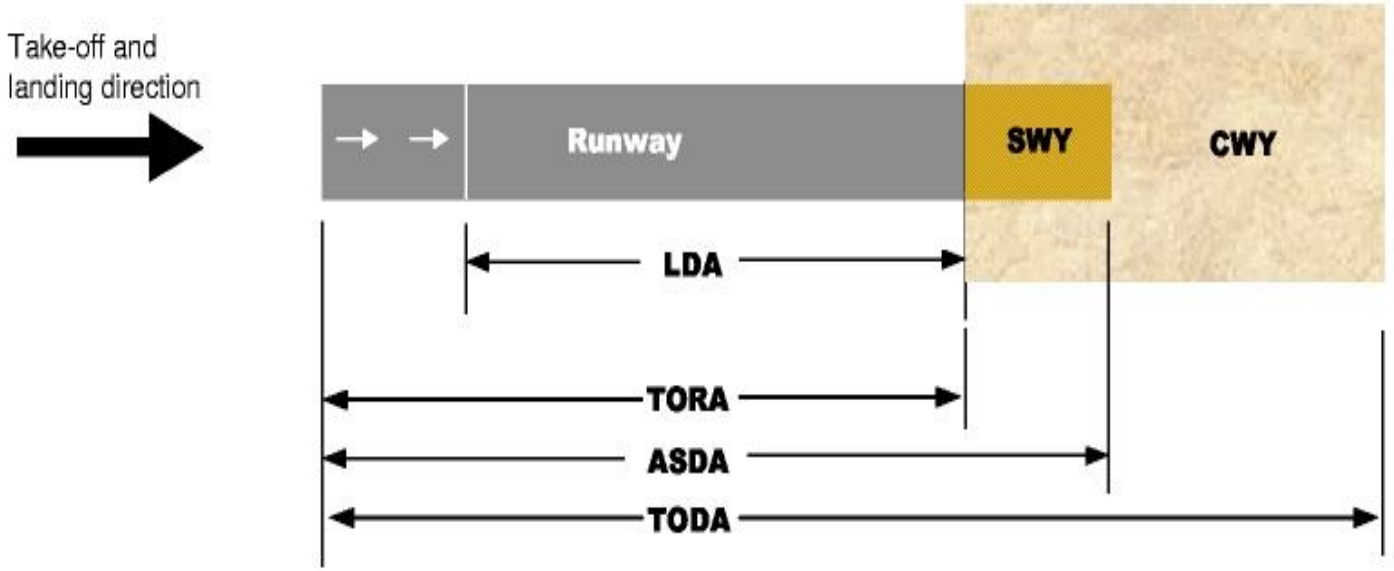


Aerodrome Design

Geometric Design of the Aerodrome

Landing distance available when threshold is displaced.

LDA = Length of RWY – Length of Displaced threshold



Aerodrome Design

Classification of Runway

→ Non-instrument runway: *A runway intended for the operation of aircraft using visual approach procedures.*

→ Instrument runway: *One of the following types of runways intended for the operation of aircraft using instrument approach procedures:*

a) Non-precision approach runway: *An instrument runway served by visual aids and a non-visual aid providing at least directional guidance adequate for a straight-in approach.*

Aerodrome Design

Classification of Runway

b) Precision approach runway, category I: *An instrument runway served by ILS and/or MLS and visual aids intended for operations with a decision height not lower than 60 m (200 ft) and either a visibility not less than 800 m or a RVR not less than 550 m.*

c) Precision approach runway, category II: *An instrument runway served by ILS and/or MLS and visual aids intended for operation with a decision height lower than 60 m (200 ft) but not lower than 30 m (100 ft) and RVR not less than 350 m.*

Aerodrome Design

Classification of Runway

d) Precision approach runway, category III: *An instrument runway served by ILS and/or MLS to and along the surface of the runway and:*

A – *intended for operations with a decision height lower than 30 m (100 ft), or no decision height and a RVR not less than 200m.*

B – *intended for operations with a decision height lower than 15 m (50 ft), or no decision height and a RVR less than 200 m but not less than 50 m.*

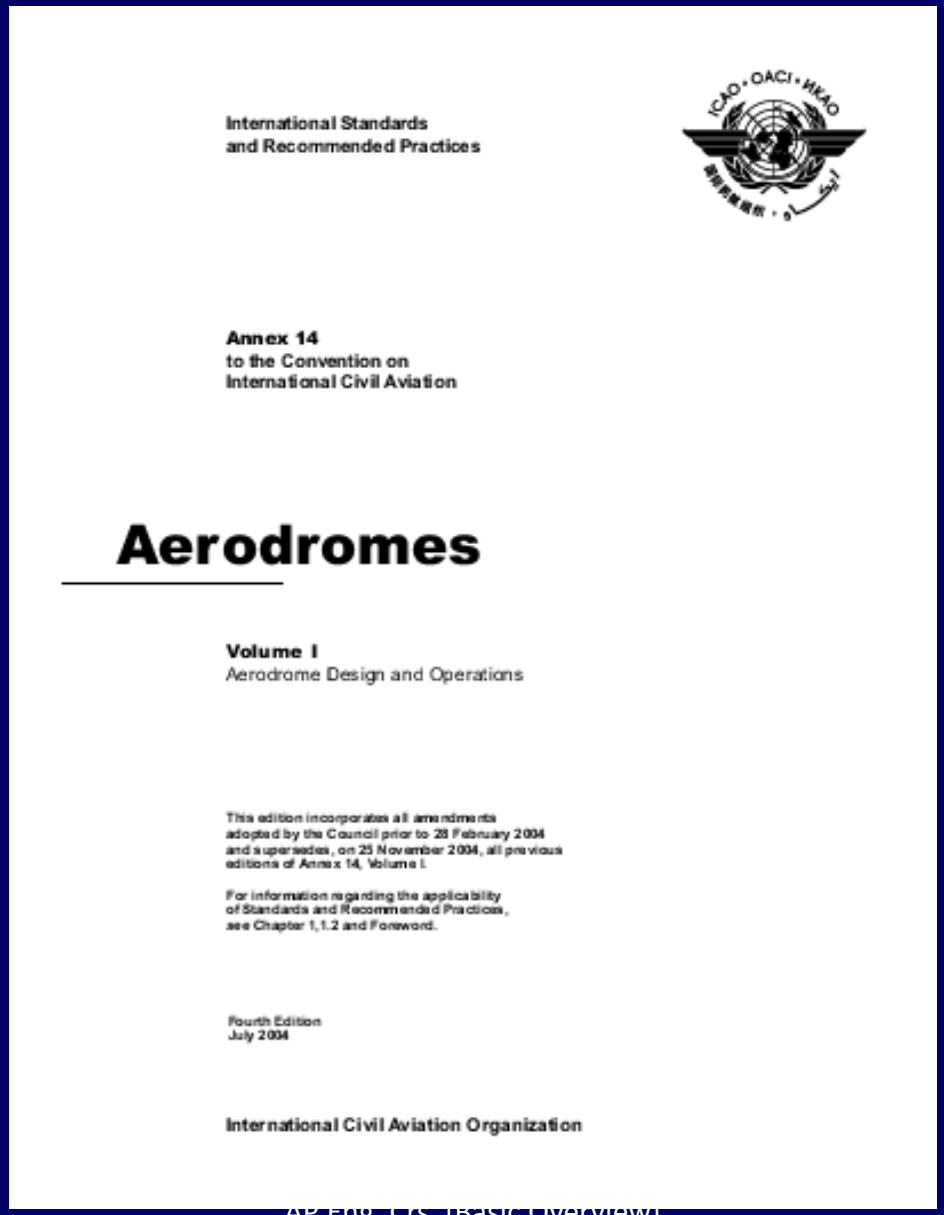
C – *intended for operations with no decision height and no RVR limitations.*

Aerodrome Design

Physical Characteristics of Aerodrome, Obstacle Limitation Surfaces and Visual Aids for Navigation

Physical characteristics of aerodrome, specially the elements of the airside such as runway and taxiway width, apron and their associated parts, obstacle limitation surfaces and visual aids are determined based on *aerodrome reference code* and *type of runway for aircraft operations* in accordance with the standards and recommended practices given in the *ICAO Annex 14 Volume I Aerodrome Design and Operations.*

Aerodrome Design



International Standards
and Recommended Practices

ICAO • OACI • ИКАО

Annex 14
to the Convention on
International Civil Aviation

Aerodromes

Volume I
Aerodrome Design and Operations

This edition incorporates all amendments
adopted by the Council prior to 28 February 2004
and supersedes, on 25 November 2004, all previous
editions of Annex 14, Volume I.

For information regarding the applicability
of Standards and Recommended Practices,
see Chapter 1, 1.2 and Foreword.

Fourth Edition
July 2004

International Civil Aviation Organization

Aerodrome Design
Physical Characteristics

Width of runways

Recommendation.— *The width of a runway should be not less than the appropriate dimension specified in the following tabulation:*

Code number	Code letter					
	A	B	C	D	E	F
1[a]	18 m	18 m	23 m	-	-	-
2[a]	23 m	23 m	30 m	-	-	-
3	30 m	30 m	30 m	45 m	-	-
4	-	-	45 m	45 m	45 m	60 m

a. The width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.

Aerodrome Design
Physical Characteristics

Slopes on runways

Longitudinal slopes

Recommendation.— *The slope computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length* ***(effective gradient)*** *should not exceed:*

*— **1 per cent** where the code number is 3 or 4; and*

*— **2 per cent** where the code number is 1 or 2.*

Aerodrome Design
Physical Characteristics

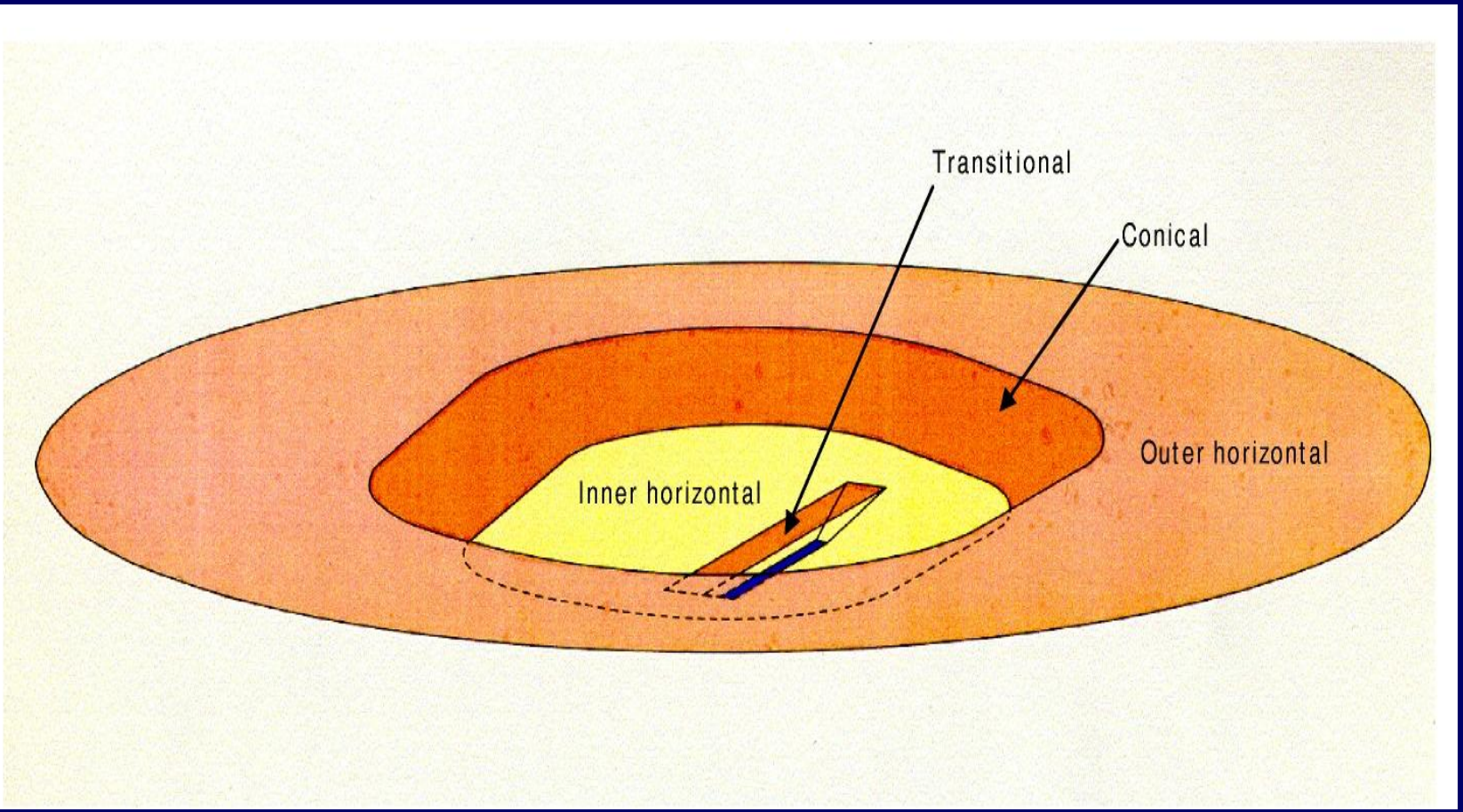
Width of taxiways

Recommendation.— *A straight portion of a taxi-way should have a width of not less than that given by the following tabulation:*

Code letter	Taxiway width
A	***7.5 m***
B	***10.5 m***
C	***15 m*** *if the taxiway is intended to be used by aeroplanes with a* ***wheel base less than 18 m****;* ***18 m*** *if the taxiway is intended to be used by aeroplanes with* ***a wheel base equal to or greater than 18 m****.*
D	***18 m*** *if the taxiway is intended to be used by aeroplanes with* ***an outer main gear wheel span of less than 9 m****;* ***23 m*** *if the taxiway is intended to be used by aeroplanes with* ***an outer main gear wheel span equal to or greater than 9 m.***
E	***23 m***
F	***25 m***

Aerodrome Design

Obstacle Limitation Surfaces



Aerodrome Design

Obstacle limitation requirements

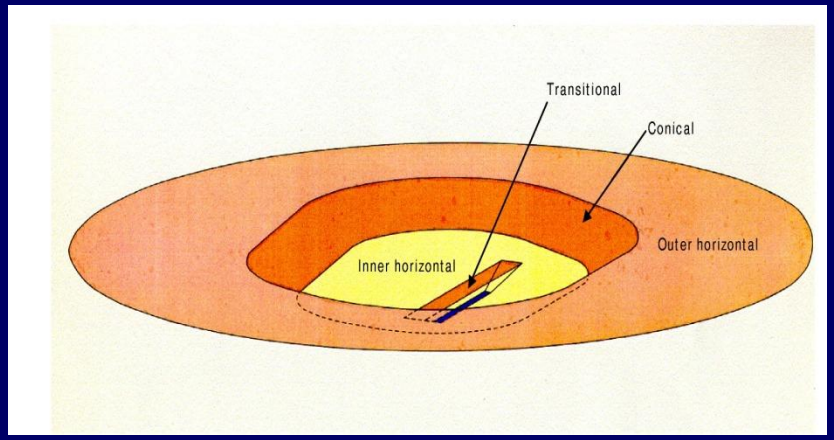
→ The following obstacle limitation surfaces shall be established for a *non-instrument and non-precision approach runways*:

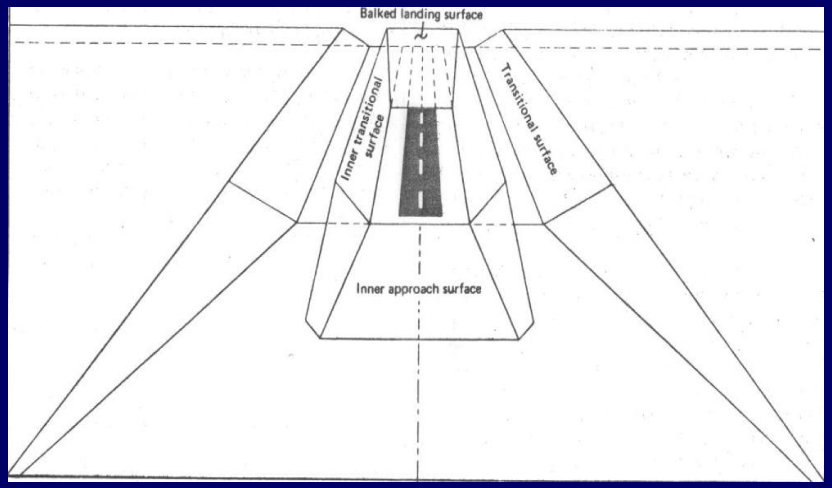
— conical surface;

— inner horizontal surface;

— approach surface; and

— transitional surfaces.

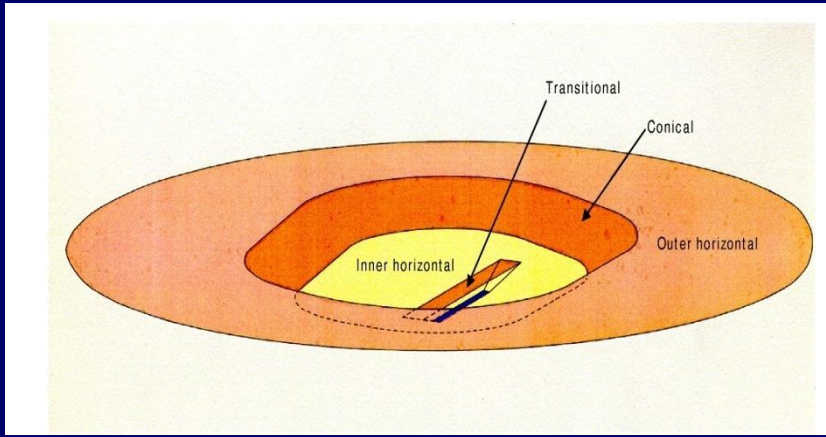




Aerodrome Design
Obstacle limitation requirements

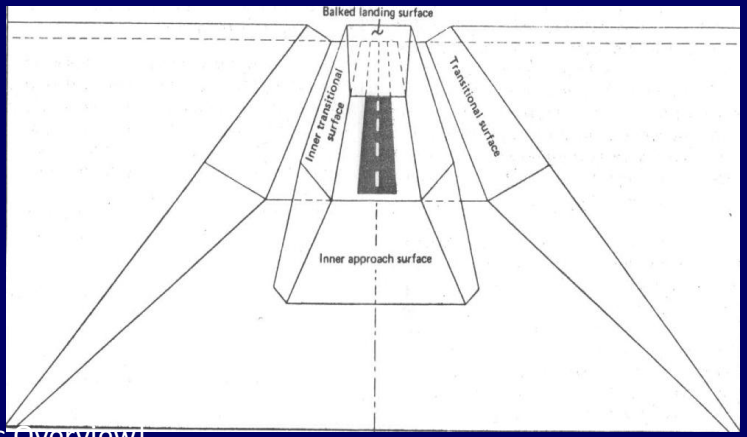
→ The following obstacle limitation surfaces shall be established for a **precision approach runway category I:**

— conical surface;
— inner horizontal surface;
— approach surface; and
— transitional surfaces.



Recommendation.— *The following obstacle limitation surfaces should be established for a* ***precision approach runway category I:***

— *inner approach surface;*
— *inner transitional surfaces; and*
— *balked landing surface.*



Aerodrome Design
Obstacle limitation requirements

→ The following obstacle limitation surfaces shall be established for a **precision approach runway category II or III:**

— conical surface;

— inner horizontal surface;

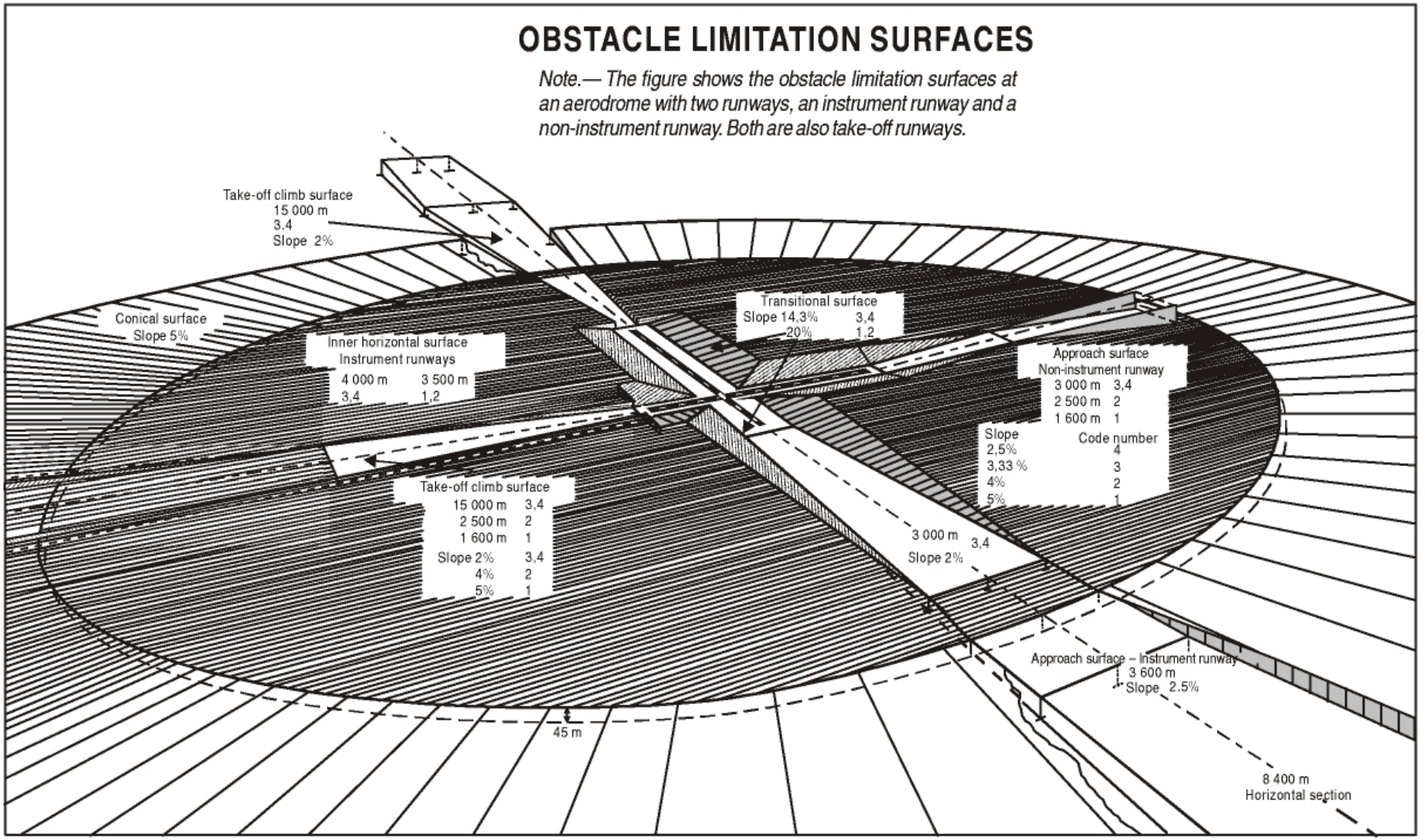
— approach surface and inner approach surface;

— transitional surfaces;

— inner transitional surfaces; and

— balked landing surface.

Aerodrome Design

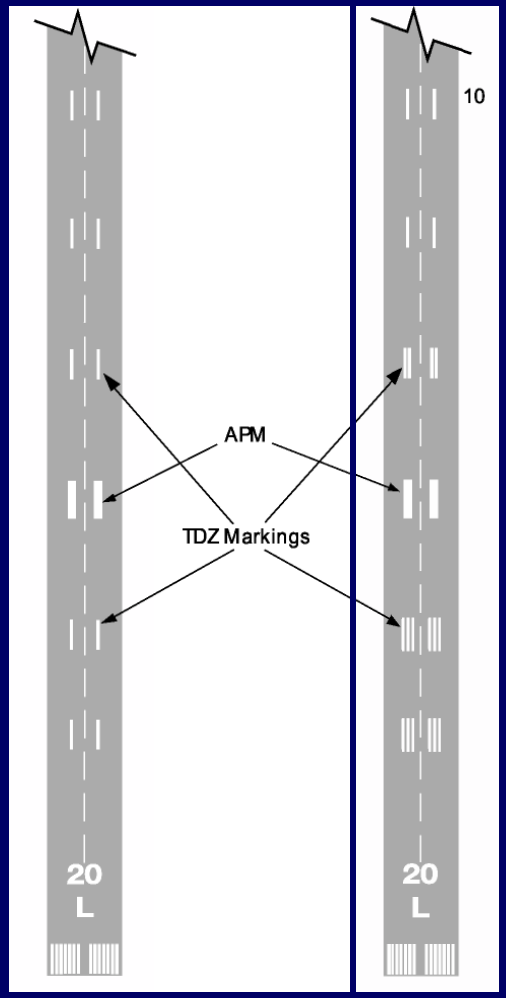


Aerodrome Design

Visual Aids for Navigation:

- → Markings
  - ↗ Runway markings are white.
  - ↗ Taxiway markings are yellow.

Taxiway Markings



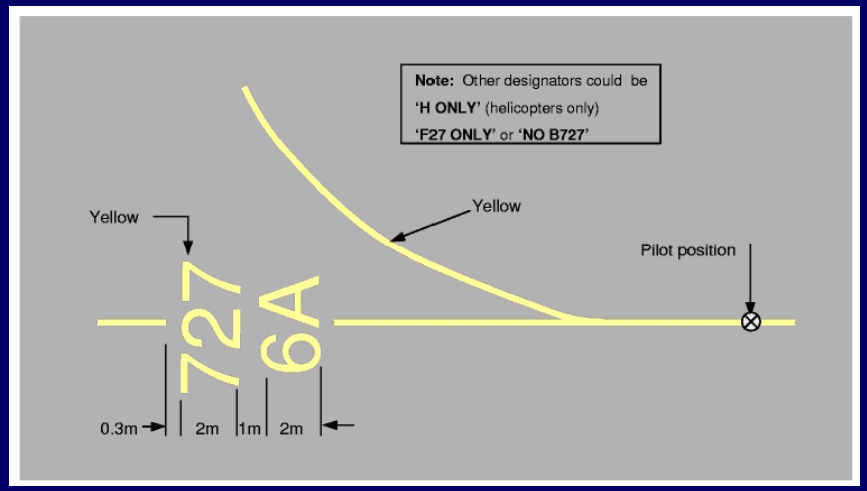
Runway Markings

Aerodrome Markings

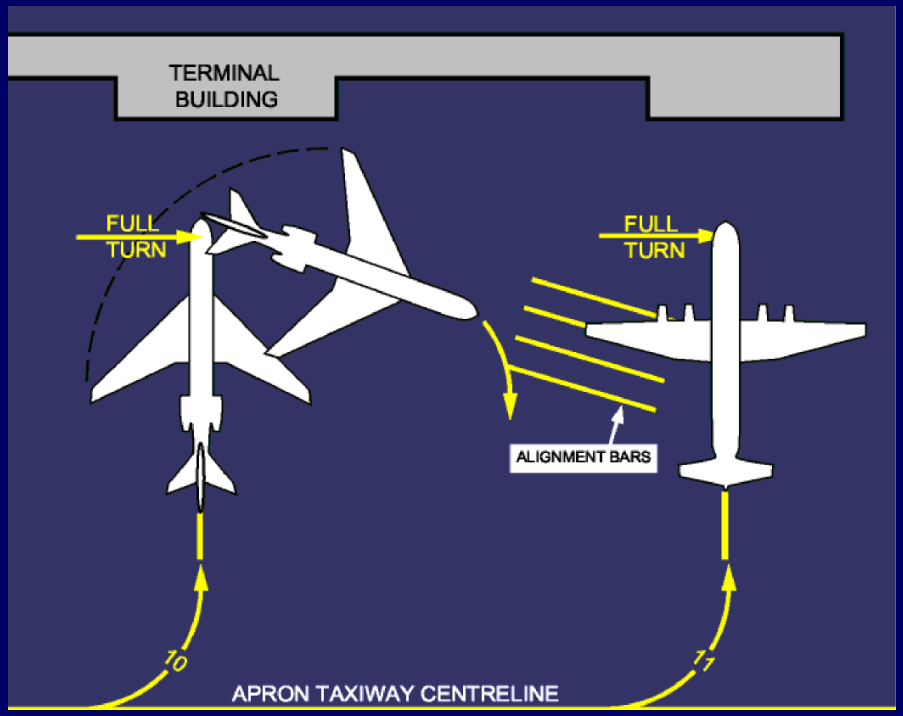
Aerodrome Design

Visual Aids for Navigation

Aircraft Stand Marking



Aircraft Stand Identification Markings (Aircraft type limit)

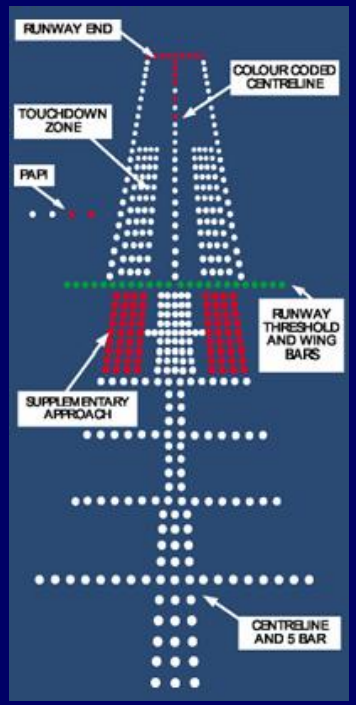


Aircraft Stand Marking

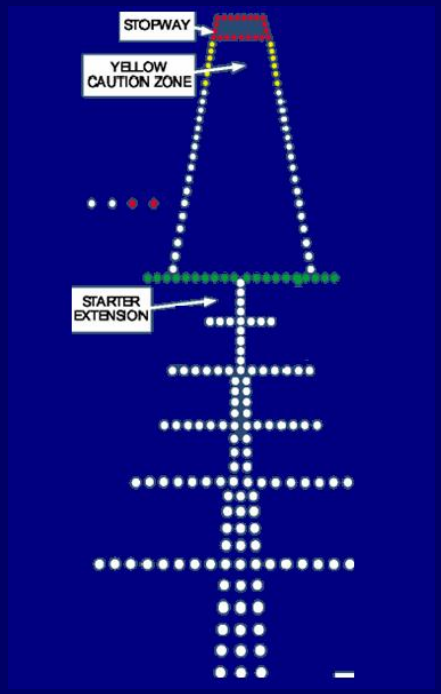
Aerodrome Design

Visual Aids for Navigation

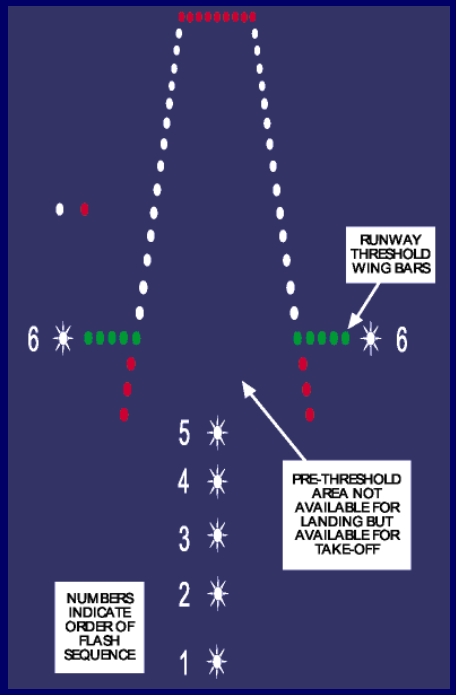
- Lights
  - Approach Lights
  - Runway Lights



Cat. II & III runway



Cat. I runway



Non-instrument /Non-precision approach runway

Aerodrome Design

Visual Aids for Navigation

- Runway Lights
  - Approach lights are white
  - Runway centreline and edge lights are white.
  - Runway end lights are red.
  - Runway threshold lights are green.
- Taxiway Lights
  - Taxiway edge lights are blue.
  - Taxiway centreline lights are green.

Aerodrome Design

Visual Aids for Navigation

ILS Cat. III Lighting System

Aerodrome Design

Visual Aids for Navigation

Aerodrome Design

Visual Aids for Navigation

Aerodrome Design

Visual Aids for Navigation

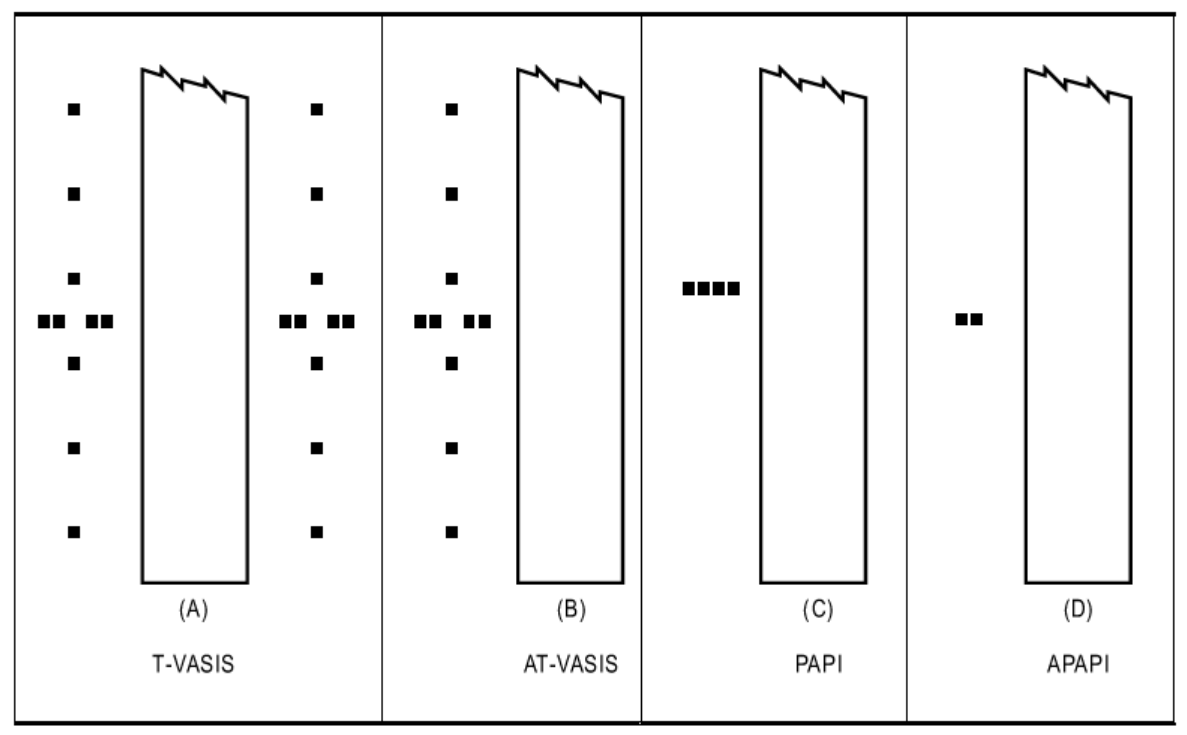
Visual approach slope indicator systems:

→ T-VASIS

→ AT-VASIS

→ PAPI

→ APAPI

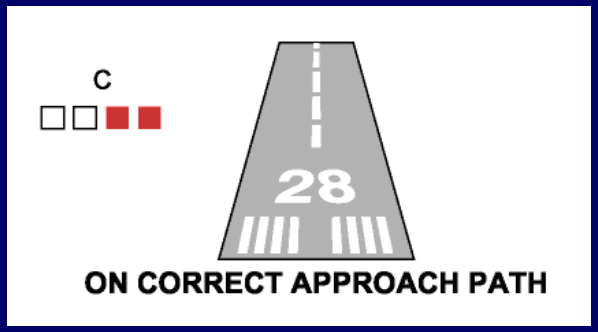


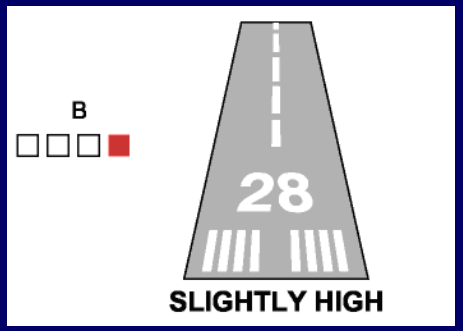
Aerodrome Design

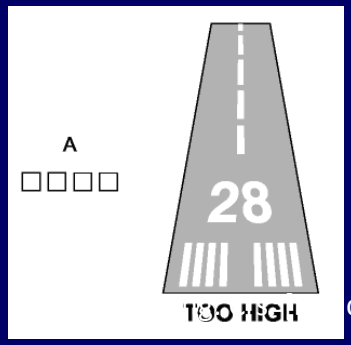
Visual Aids for Navigation

Precision Approach Path Indicator System (PAPI):

- → Most commonly used VASIS
- → Shall be located on the left side of the landing runway
- → Generally sets for 3° glide slope







Aerodrome Design

Visual Aids for Navigation

Aerodrome Design
Visual Aids for Navigation

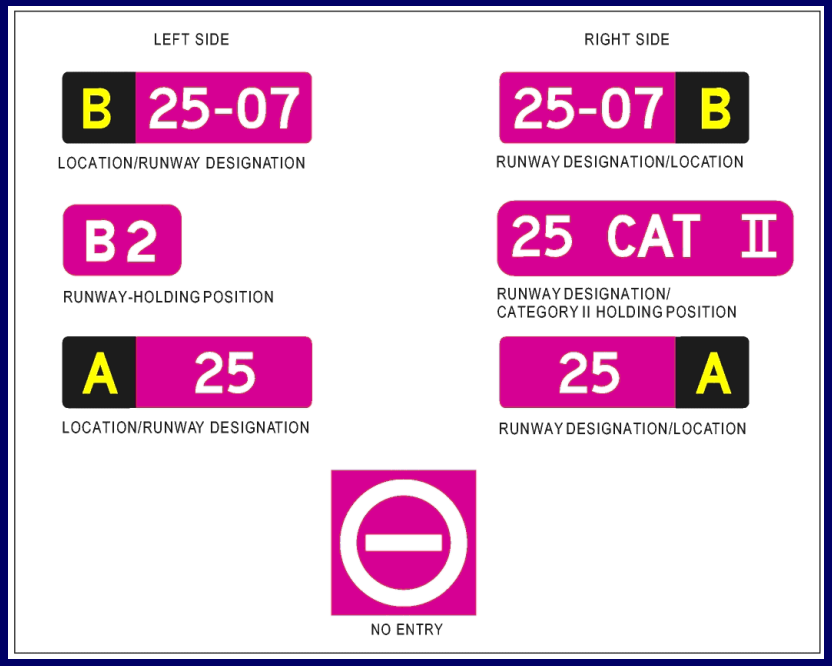
Aerodrome Design

Visual Aids for Navigation

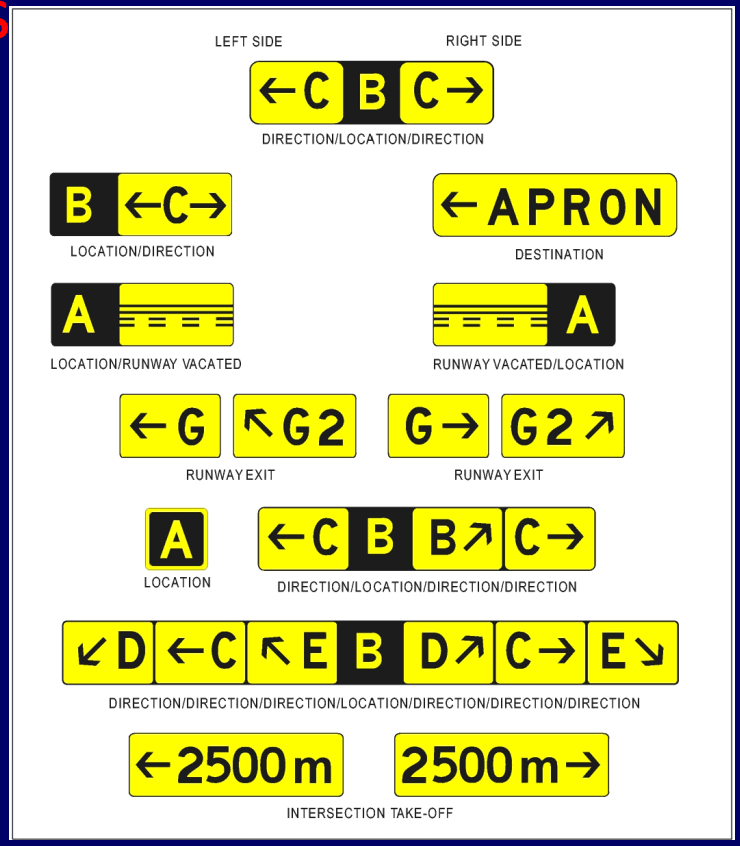
Signs:

→ Mandatory Instruction Signs

→ Information Signs



Mandatory instruction signs



Information signs

Aerodrome Design

Visual Aids for Navigation

Aerodrome Design

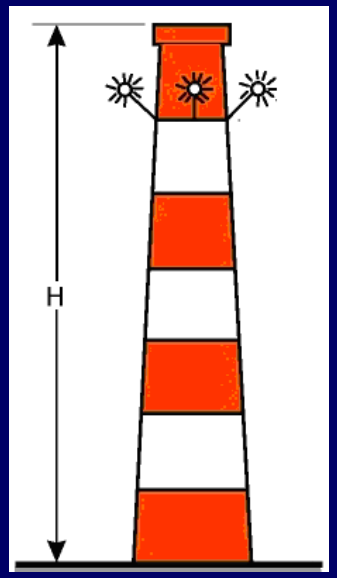
Visual Aids for Navigation

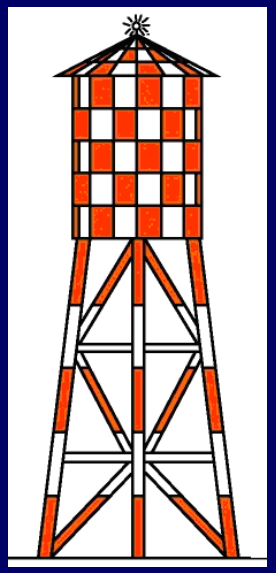
Aerodrome Design

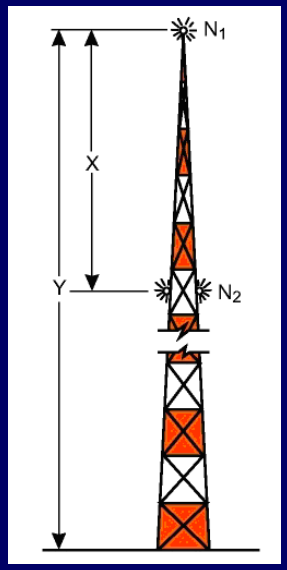
Visual Aids for Denoting Obstacles

Marking and Lighting of Obstacles:

- → *A fixed obstacle that extends above any obstacle limitation surfaces should be marked and, if the runway is used at night, lighted.*
- → *The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of the obstacles.*







Aerodrome Design

Visual Aids for Denoting Obstacles

Marking and lighting of glide path antenna and hut.

Aerodrome Design

Radio Navigation Aids (Non-visual Aids for Navigation)

- Non-directional beacon (NDB);
- Very high frequency omni-directional radio-range (VOR);
- Distance measuring equipment (DME);
- Instrument landing system (ILS):
  - Localizer arrays;
  - Glide path antenna; and
  - Marker beacons (Outer, middle and inner markers).

Aerodrome Design

Radio Navigation Aids

Aerodrome Design

Radio Navigation Aids

Aerodrome Design

Radio Navigation Aids

Glide path antenna and hut.

Aerodrome Design

Aerodrome Pavements

Type of aerodrome pavements:

→ Rigid aerodrome pavements:

Examples:

Plain cement concrete (PCC) pavement;

Reinforced cement concrete (RCC) pavement;

Plain cement concrete pavement

Design of rigid pavement:

- ❑ **Strength of concrete**
- ❑ **Modulus of sub-grade reaction**
- ❑ **Aircraft maximum take-off load**

Aerodrome Design

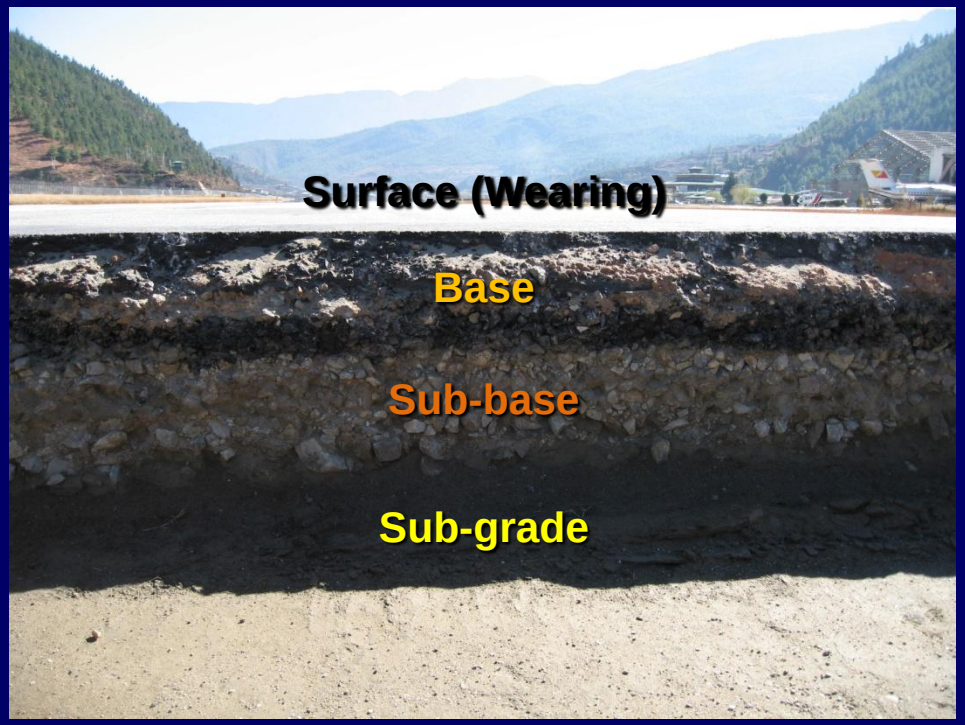
Aerodrome Pavements

Type of aerodrome pavements:

→ Flexible aerodrome pavements:

Examples:

Bituminous pavement (asphalt concrete);



Structural layers of flexible pavement

Design of flexible pavement:

- ❑ **CBR Method (CBR Value)**
- ❑ **Elastic layer method (Modulus of elasticity)**

Aerodrome Design

Strength of Aerodrome Pavements

ACN/PCN method for pavement strength reporting:

- ✓ Pavement Classification Number (PCN)
- ✓ Pavement type (F or R)
- ✓ Pavement sub-grade strength category (A, B, C or D)
- ✓ Maximum allowable tyre pressure category/value (W, X, Y or Z)
- ✓ Evaluation method (T or U)

PCN 76/F/B/W/T PCN 50/F/C/Y/U PCN58/R/B/1.20MPa/T

Aerodrome Construction

Aerodrome Construction

Earth Works:

- Balance of cutting and filling;
- Mass-haul diagram

Aerodrome Construction

Technology and Equipment for Aerodrome Construction

→ Earth cutting, moving and rolling equipment:

- ↗ Excavators;
- ↗ Dozers;
- ↗ Graders;
- ↗ Dumpers;
- ↗ Rollers;
- ↗ Water Tankers; etc.

Aerodrome Construction

Technology and Equipment for Aerodrome Construction

Equipment for the construction of rigid pavements:

- Concrete batching plant;
- Concrete mixer/transporter;
- Vibrators;
- Air compressor;
- Concrete cutter; etc.

Aerodrome Construction

Technology and Equipment for Aerodrome Construction

Equipment for the construction of flexible pavements

- Aggregate crushing plant;
- Aggregate spreader;
- Bitumen spreader;
- Asphalt mixing plant;
- Asphalt paver;
- Rollers (pneumatic, steel etc.)

Aerodrome Construction

Technology and Equipment for Aerodrome Construction

Aerodrome Construction

Technology and Equipment for Aerodrome Construction

Asphalt Paver

Aerodrome Construction

Technology and Equipment for Aerodrome Construction

Rollers

Aerodrome Construction

Aerodrome Construction

Technology and Equipment for Aerodrome Construction

Quality Control in Aerodrome Construction

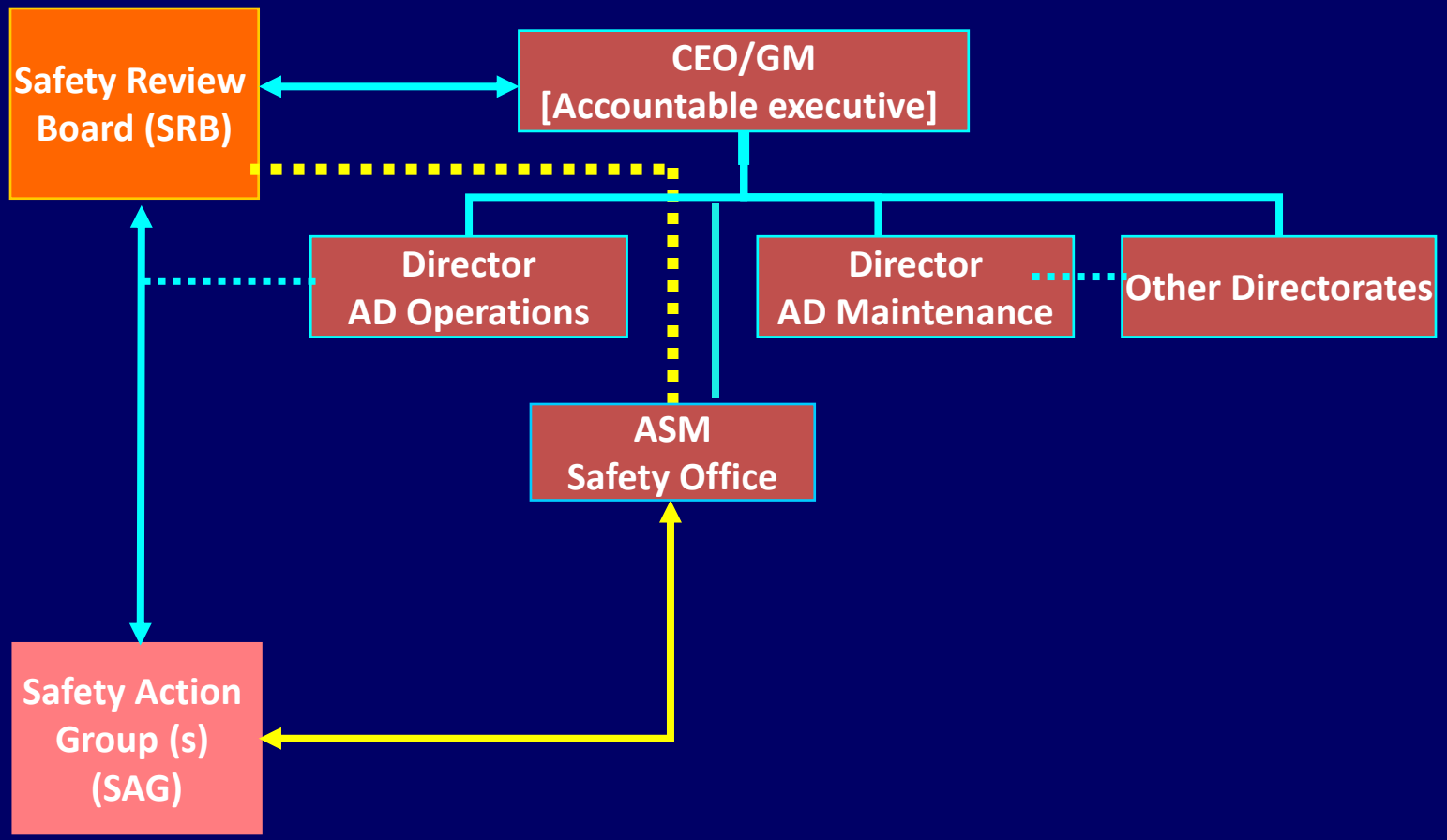
- Laboratory tests of the construction materials:
  - Mix design (cement concrete as well as asphalt concrete);
  - Soaked CBR tests of sub-grade and construction materials;
  - Grading of aggregates and sand; etc

- In situ test
  - Plate bearing;
  - Compaction test;
  - Proof rolling;
  - Deflection test, etc.

Part IV - Aerodrome Management and Operations

Aerodrome Management and Operations

Aerodrome Administration and Management



Organization Chart of the Airport

Aerodrome Management and Operations

Aerodrome Services

- Rescue and fire fighting services;
- Ground handling services;
- Refueling services;
- Catering services;

Aerodrome Management and Operations

Aerodrome Services

Rescue and Fire Fighting Services

Aerodrome Management and Operations

Aerodrome Services

Ground Handling Services

Aerodrome Management and Operations

Utility Services

- Communications (telephone, internet, VHF radios etc.)
- Power supply (Electricity);
- Water supply;
- Sewerage;

Aerodrome Management and Operations

Air Navigation Services

- Air Traffic Services;
- Navigational aids;

Meteorological Services

Airport Security Services

Aerodrome Management and Operations

Aerodrome Certificate

Requirement for an aerodrome certificate:

ICAO Annex 14 standards require certification of aerodromes:

- Used for international operations;
- By CAA; and
- In accordance with established criteria for the certification of aerodromes.

[ICAO Doc. 9774, Manual on Certification of Aerodromes, First Edition – 2001]

Aerodrome Management and Operations

Aerodrome Certificate

Criteria for the certification of aerodromes:

Before granting an aerodrome certificate the CAA must be satisfied that:

- The aerodrome operator has competent and experienced staff for the proper maintenance and operation of aerodrome;
- The aerodrome operator has submitted an aerodrome manual containing all relevant information of the aerodrome;
- The aerodrome facilities, services and equipment are in accordance with the requirements of the National Aerodrome Standards;
- The aerodrome operating procedures make satisfactory provision for the safety of aircraft; and
- An acceptable safety management system is in place at the aerodrome.

[ICAO Doc. 9774, Manual on Certification of Aerodromes, First Edition – 2001]

Safety Management System

ICAO requirements:

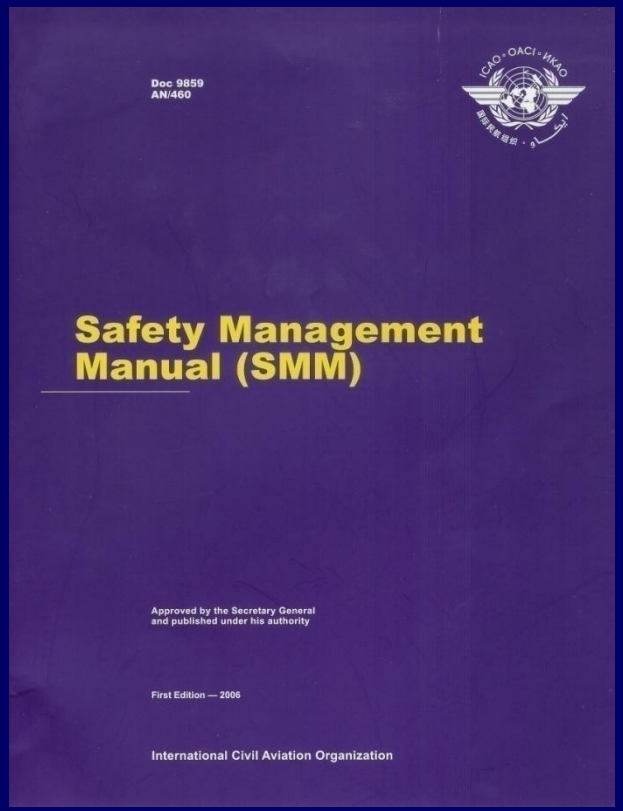
States shall require, as part of their safety programme, that a **certified aerodrome operator** implements a **safety management system** accepted by the State that, as a minimum:

- Identifies safety hazards;
- Ensures that remedial action necessary to maintain an acceptable level of safety is implemented;
- Provides for continuous monitoring and regular assessment of the safety level achieved; and
- Aims to make continuous improvement to the overall level of safety.

Safety Management System

What is an SMS ?

- A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.
- Providers are responsible for establishing an SMS.
- States are responsible of the acceptance and oversight for providers' SMS.


Doc 9859
AN/460
Safety Management Manual (SMM)
Approved by the Secretary General and published under his authority
First Edition — 2006
International Civil Aviation Organization

State Safety Programme (SSP)

1. **Safety policy and objectives**
   - 1.1 Management commitment and responsibility
   - 1.2 Safety accountabilities
   - 1.3 Appointment of key safety personnel
   - 1.4 Coordination of emergency response planning
   - 1.5 SMS documentation
2. **Safety risk management**
   - 2.1 Hazard identification
   - 2.2 Risk assessment and mitigation
3. **Safety assurance**
   - 3.1 Safety performance monitoring and measurement
   - 3.2 The management of change
   - 3.3 Continuous improvement of the SMS
4. **Safety promotion**
   - 4.1 Training and education
   - 4.2 Safety communication.

Airport Engineering Course [Basic Overview]

End of Class

Any Questions?